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ON CHLOROFORM.

By John M. Maisch.

In the Proceedings of the American Pharmaceutical Association for 1866, page 264, I have reported the results of a series of experiments made in August, 1865, with the view of determining the cause of the decomposition of chloroform.* The results may be briefly stated as follows:

1. Pure chloroform of 1·49 sp. gr. is decomposed by light, but not in the dark;

2. Pure chloroform diluted to 1·475 sp. gr. is decomposed neither by light or in the dark, nor in the presence or absence of moisture.

All the vessels in which the experiments were made contained more or less air.

During the year 1866 the decomposition of chloroform has been the subject of repeated investigations in Europe; the following will exhibit the results at which the experimenters arrived:—

Hager† found a chloroform of 1·496 sp. gr., which had been kept in a dark closet for three months, to contain free muriatic acid; the acid reaction could not be entirely removed by agitation with magnesia and subsequent rectification, and the water shaken with the chloroform contained much muriatic, but little formic and

* Am. Jour. Pharm. 1867, 72.

† Pharmac. Central Halle, vii, 426.

chloro-acetic acids. The author recommends to keep chloroform in several vessels in a dark and cool place, and suggests its preparation from methylic alcohol, or with a strong chlorinated lime, as the probable cause of the decomposition.

In an essay on the coloring matters of bile, G. Städeler* states: "Chloroform, in the state of continuous decomposition, is now rather frequently met with in commerce. Recently rectified over some alkali, it has the odor of pure chloroform; but it rapidly becomes acid, and evolves the suffocating odor of phosgene gas. Such a chloroform dissolves bilirubin with a green color, and likewise changes its yellow solution in pure chloroform to green. Since less than one milligramme of bilirubin is sufficient for this reaction, and since it takes place when the decomposition has just set in, and the odor of phosgene gas is hardly perceptible, I consider bilirubin as an excellent reagent to test chloroform for its medicinal purity. I have never observed this decomposition and this reaction with bilirubin, with good chloroform prepared from alcohol."

From communications received by Dr. H. Hager in regard to chloroform inclined to spontaneous decomposition, he infers† that the different specimens were not alike, and that the causes of their decomposition likewise appear to differ; chlorine substitutes of a higher order he regards as the principal cause, and suggests their removal by fractional distillation, collecting that only which is obtained between 60° and 65° C. (140° and 149° F.) Steltzner's method for regenerating decomposed chloroform by agitation with solution of caustic potassa and rectification, is not applicable in all cases.

The fatal result by the inhalation of chloroform at the surgical clinic of the Berlin University was followed by an examination of the anæsthetic used. Dr. Martins‡ found that only one-third of it distilled at 62° C., the temperature rose rapidly to 70°, 72°, 75°, and a considerable residue was left even at 80° C.; it contained neither free chlorine nor muriatic acid, but had the suffocating odor of phosgene gas and chloride of carbon. It evidently contained higher chlorinated compounds.

* Ann. d. Chem. und Pharm. 1864, 319.
† Pharmac. Central Halle, vii, No. 49.
‡ Archiv d. Pharm. 1867, March, 255.

Dr. Bartscher* ascribes the bad effects of chloroform to its spontaneous decomposition, even if originally pure, in the course of two to three months, in consequence of which muriatic acid, alcohol, and chloride of ethylene is then found in it. He demands that before it is used for inhalation, chloroform must be examined, and, if necessary, rectified; also that it be preserved in a dark bottle, kept in a dark place.

Subsequently Hager† insisted that pure chloroform is not decomposed by sunlight. Not having seen this paper, I am not able to tell upon what grounds he makes this assertion.

Professor Wiggers‡ has kept chloroform in a shady place unaltered for more than fifteen years; it had been prepared by himself from alcohol, and was purified by treatment with concentrated sulphuric acid. He further remarks: "It may be considered proven that a well-prepared, pure chloroform, of the formula $C_2 H Cl_3$, is not altered on keeping if it is guarded against sunlight, and likewise carefully against daylight. We ask now, how and from what materials is that chloroform prepared which is so readily decomposed? Is it true chloroform, and does the decomposition take place under all circumstances only in consequence of the foreign admixtures? What are these foreign admixtures, and what products are formed in consequence of this spontaneous decomposition? To answer these queries, would it not simplify the inquiry to trace such a chloroform back to its source, to ascertain the mode of preparation, and what admixtures it may therefore contain?"

The effect of light on chloroform was studied by Dr. C. Schacht§ in May, 1867. The chloroform used in his experiments had at 18·5° C. (65·3° F.) a specific gravity of 1·4960, did not react with pure concentrated sulphuric acid, was free from alcohol, and had a constant boiling point of 67° C. (152·6° F.); water agitated with this chloroform was not affected by nitrate of silver. The unvarying boiling point and the silver test are regarded by the author as sufficient to prove the purity of chloro-

* Ibid.

† Pharm. Central Halle, 1867, No. 40.

‡ Jahresbericht der Pharmacognosie, &c., 1866, p. 329.

§ Archiv. d. Pharm. 1867, Dec., 213.

form. If this chloroform was exposed for a short time to the sunlight in filled or half-filled bottles, it contained hydrochloric acid and phosgene gas; but it kept unaltered if excluded from the sunlight; diffused daylight has the same effect after a longer period; freed by sodium from all adhering moisture, it was decomposed in precisely the same manner. Pure chloroform is not affected by diffused daylight or direct sunlight, if preserved in a perfect vacuum.

At the close of his paper, Dr. C. Schacht gives, from Dingler's Polytech. Journ., Oct., 1867, a short account of the results as published in my previous paper; and from his remarks it is evident that he has not tried the behaviour, in the direct sunlight, of chloroform reduced by alcohol to the specific gravity of 1·475.

The points which, according to the above papers, seem to require investigation, are—

1. The process and material employed in the manufacture of chloroform prone to spontaneous decomposition;

2. The regeneration of chloroform which has been decomposed by light;

3. Additional proof that chloroform of 1·475 is not decomposed by sunlight.

During the year 1864, and in the early part of 1865, very considerable quantities of chloroform were made at the U. S. Army Laboratory of this city, under my personal supervision. Some of this chloroform was found to be rapidly decomposed when kept on the shelves, and this observation led to the experiments which resulted in determining the fact that a reduction of its specific gravity by alcohol prevents this decomposition.

I had the following apparatus built for preparing and rectifying chloroform:

The still was made of heavy boiler iron, 8¼ feet high and 3 feet diameter, with a capacity of about 780 gallons; the top and bottom, being sections of a sphere, were of cast iron. The whole rested upon four feet made of heavy iron pipe, and was placed a few inches below the level of the floor, so that the discharge cock could be conveniently turned. This latter, a so-called two-inch round way cock, connected by means of a bent iron pipe with the bottom of the still, the contents of which could thereby be run

off directly into a drain connecting with the sewer. A system of upright steam pipes was attached near the centre of the bottom, and so arranged that the steam ascended the inner (smallest), and descended through the outer (larger) pipes. About half-way up on the side a three-quarter-inch steam pipe passed into the interior, and was bent in an oblique direction towards the bottom, its lower half being perforated for the purpose of injecting steam.

The top contained a man-hole 16 inches in diameter, with a high flange cast around it, upon which fitted a copper still-head; into the tubulure, 3 inches in diameter, a pipe of pure lead was inserted, reaching below the base of the head; the opening was closed by a screw-cap. The head was connected with an iron safety chamber, the object of which was to prevent the mixture in the still from reaching the receiver, in case it should boil over.

The charge was mixed in the third story, in an iron kettle, then strained into a lead-lined wooden tank elevated on the second floor, and from this, by means of a two-inch round way cock, and a piece of lead or rubber tube, through the tubulure, which was nearly even with the floor, run into the still below.

As much as 800 pounds of chlorinated lime, containing 30 per cent. active chlorine, has been worked successfully at one time; this was mixed with 350 gallons of water and 18 gallons of 95 per cent. alcohol, and the mixture heated to 120° F. by blowing steam into it. The temperature was ascertained by a thermometer dipping into solution of chloride of zinc, which was kept in an iron tube inserted in the lower half of the still. A little steam was now kept in the upright pipes,—merely sufficient to compensate for the loss of heat by the surrounding air. Soon the temperature rises, and the chloroform distils over; when it ceases to distil, steam is again blown in, and the mixture kept in active boiling for some time, until all chloroform and alcohol has distilled.

The crude chloroform settled in the receiver from the distillate was transferred to the wash-can, where it was agitated with three successive portions of water. When the alcohol had been thus removed, the chloroform was agitated in a leaden tank with about one-sixth of its weight of sulphuric acid, and the two

liquids left in contact, with occasional agitation, until sulphuric acid was scarcely colored on being shaken with a little of the chloroform. The latter liquid was then repeatedly agitated in a copper can with a concentrated solution of carbonate of soda, to remove adhering sulphuric acid. The chloroform was separated, and—about sixteen gallons at one time—subjected to rectification from a copper still, after it had been previously diluted, according to its specific gravity, with from eight to sixteen ounces of alcohol, to bring its density within the limits allowed by the pharmacopœia.

It will be observed that the process of preparing chloroform is that of B. Hirsch,* with such modifications as were found convenient and requisite to work such large quantities. The chlorinated lime used was of English manufacture, and usually contained in the neighborhood of 35 per cent. active chlorine; the percentage rarely fell below 30, and was once as low as 17¾ per cent. The actual weight of the lime compound was decreased with the increase of the amount of chlorine; but if the latter fell below 30 per cent. the alcohol was lessened in proportion, since experience proved that more than 800 pounds could not be conveniently worked in the still at one time.

The various wash waters of the crude chloroform were always used in the next charge, the amount of alcohol contained therein having previously been approximately ascertained.

Various methods had been carefully tested before the above process was finally adopted; among them I may mention the quick heating of the mixture until it rapidly rose in the still, checking its passing over by cold water; also the heating of the mixture to as high a point above 120° (about 160° F.) as could be prudently done without imminent danger of the charge being carried over; also the blowing of alcohol under steam pressure into a mixture of chlorinated lime and water, heated to various temperatures. All these methods failed to give the good results obtained by the process finally adopted.

From the few memoranda now in my possession, I select the following experiments:

* Amer. Journ. Pharm. 1862, 42.

620 lbs. chlorinated lime of 30·86 per ct. = 191·3 lbs. active chlorine, 300 galls. water, and 13·5 galls. 95 per ct. alcohol; temperature 86° F., in 15 minutes 90°, 22 min. 110°, 30 min. 120°, 40 min. 130°, 44 min. 134° (injected steam turned off), 76 min. 144°, 100 min. 150°, 104 min. 153° (chloroform commenced to distil slowly, by drops), 116 min. 160°, 130 min. 170°, 142 min. 180°, 151 min. 190°, and the distillation slackening, steam was gradually injected; distillation finished in 190 minutes. Result: crude chloroform, washed once, 45·5 lb. = 23·78 per ct. of the chlorine employed.

650 lbs. chlorinated lime of 30·86 per ct. = 200·6 lbs. chlorine; 310 galls. water, 17 galls. 95 per ct. alcohol; temperature 76° F., in 22 min. 90°, 27 min. 100°, 32 min. 110°, 38 min. 120°, 51 min. 130°, 59 min. 140° (injected steam off), 71 min. 150°, 80 min. 160°, 89 min. 170°, 97 min. 180°, 102 min. 190°, 110 min. 200°; steam was now injected to boil the residue; distillation finished in 165 minutes. The chloroform was inadvertently mixed with that of the next charge, which consisted of—

750 lbs. chlorinated lime of 17·7 per ct. = 132·75 lbs. chlorine, 330 galls. water, 11¾ galls. 95 per ct. alcohol; temperature 90° F., in 16 min. 110°, 20 min. 120°, 23 min. 130° (injected steam off), 28 min. 140°, 36 min. 150°, 45 min. 160°, 54 min. 170°, 62 min. 180°, 69 min. 190°, 78 min. 200°; distillation finished in 120 minutes. Result of the two distillations: crude chloroform washed once, 74.5 lbs. = 19·35 per cent. of the chlorine employed.

800 lbs. chlorinated lime of 36 per ct. = 288 lbs. chlorine, 275 galls. water, 19 galls. 95 per ct. alcohol; temperature 92° F., in 12 min. 100°, 15½ min. 110° (injected steam off), 23 min. 120°, 32 min. 130°, 42½ min. 140° (steam shut off from upright pipes), 65 min. 162°, 76 min. 180°. The mixture in the still had risen so rapidly that it was at this point forced over into the receiver; all attention was necessary to save the distilled chloroform, and prevent an explosion of the apparatus. Result: crude chloroform washed once, 61·5 lbs. = 21·3 per cent. of the chlorine employed.

These few cases indicate the loss and danger sustained by too rapid heating of the mixture. The time required for running

off a charge was from three and a half to four hours, so that by good management and hard work three charges could be worked up in a day's work of eleven hours (counting the dinner hour), making about 150 ℔ washed chloroform the average product of a day. The amount of chlorinated lime actually used for each charge was equivalent to about 200 ℔ of active chlorine, or little exceeding that figure. The first charge distilled in the morning required a longer time than subsequent ones, because the whole apparatus was heated, and we started then with the temperature from 12 to 18° F. higher than early in the morning.

The process of purification is based essentially upon the same principles as that of our Pharmacopœia, though the manipulation was varied to better enable us for an uninterrupted continuance of purification, and to avoid as much as possible loss of material. The statement of Hirsch,* that washed crude chloroform can be obtained perfectly pure without previous treatment with sulphuric acid, simply by rectification at a temperature not exceeding 158° F., was repeatedly verified by experiments on a large scale (about 16 gallons at a time); but the trouble attending the limitation of temperature, in consequence of the occasional change in the pressure of steam, and the evaporation of the water from the bath, required the constant attendance of a laborer, so that it was found practicable to change the process to one which required only occasional attention.

After the chloroform had been purified by agitation with sulphuric acid and carbonate of soda, and properly diluted with alcohol, it was at first rectified in this condition; subsequently, however, the addition of some caustic lime into the rectifier was found advantageous. The distillate was collected in one-half or one gallon bottles, and the contents of each bottle tested by sulphuric acid to ascertain its purity. The last portions from the rectifying still always imparted more or less color to sulphuric acid and were returned to the sulphuric acid washer.

The rectified chloroform was kept surrounded by water in a copper tank, from which it was drawn by measuring cocks discharging respectively one-half and one pound of chloroform, sp.

* Amer. Journ. Pharm. 1862, 44.

gr. 1·490. My plan for these cocks was much simplified by Mr. T. M. Hammett of this city, who constructed them so that they worked admirably during the long time they were continually in use; they measured the weight for which they were graduated, invariably correct, and a great deal of time, labor and loss of material was saved thereby. One was first made for measuring half a pound of ether, sp. gr. 725, and finding it so admirably adapted to meet all requirements, they were likewise adopted for the chloroform, and I believe would answer equally well for all costly and volatile liquids.

The plug of these measuring cocks is of an obconical shape and hollow, and is perforated at two places, namely, just at its base even with the bottom, and perpendicularly above this point even with the top. When these perforations are turned towards the tank, the lowest one connects directly with the inside and admits the liquid, while the upper one communicates by means of a tube with the top of the tank, to remove the air from the cock into the tank; the measure is filled as soon as the liquid appears in the glass tube which forms the lower portion of the connecting tube just mentioned. A half turn is now given to the plug when the liquid is discharged from the lower opening through the nozzle, while the hollow space is again filled with air through a groove in the top of the cock, just communicating with the upper opening, without the possibility of loss by evaporation. By turning alternately to the right and to the left, the measuring cock is filled and emptied in reciprocal succession.

In the beginning of the manufacture of chloroform at the U. S. Laboratory, deodorized alcohol, the so-called cologne spirit, was employed. This alcohol is purified from the greatest but not the entire amount of fusel oil; subsequently ordinary commercial alcohol, containing a larger proportion of fusel oil, was used, and the chloroform obtained was quite as good as from the former source, if the requisite care was taken during the process of purification and rectification. At various times experiments were made with precisely the same good success, with alcohol obtained by the distillation of the dregs from the manufacture of certain fluid extracts. This alcohol was usually regenerated

by rectifying it in contact with a sufficient amount of permanganate of potassa, or sometimes bichromate of potassa and some sulphuric acid. Those powerful oxidizers, permanganic and chromic acid, destroy many odorous principles of vegetables before they oxidize the alcohol; exceptions are certain volatile oils, particularly the carbohydrogens and those containing little oxygen. But alcohol obtained from colchicum, gentian, aconite, belladonna leaves, &c., was by this process completely restored and rendered fit for use, to be sure with the loss of a little alcohol, which is destroyed by the excess of the oxidizing agents employed. Chlorine acts in a similar way, and if it should produce any liquid chlorinated compounds by reacting with these odorous principles, they are most assuredly removed by the subsequent treatment with oil of vitriol and the following rectification. It is more than probable that even the presence of considerable amounts of volatile oils in the alcohol would merely occasion a loss of chlorine, but be without effect on the purity of the chloroform, because all the chlorinated products of the volatile oils boil at a much higher temperature.

The effect of sulphuric acid upon chloroform has been frequently the subject of investigation. It is true, as stated by Dumas,* that chloroform, kept over sulphuric acid, will evolve hydrochloric acid, but this decomposition takes place only in the light, while, if the mixture is kept in blackened bottles, it will keep perfectly well. Nor does the purification with sulphuric acid render chloroform prone to subsequent decomposition, as is proven by the statement of Wiggers, cited above, which accords with my own experience. It is most undoubtedly the case, as was first stated by Gregory and afterwards by Dr. Squibb, that the sole cause of the decomposition of chloroform upon the shelves of our stores, is due to its concentration, to its freedom from alcohol.

The specific gravity of absolute chloroform is about 1·50, of which density I have repeatedly obtained it, and in this respect I can only reiterate the statements of Hirsch and others. The true specific gravity of absolute chloroform has probably not been

* Ann. de Chim. et de Phys. lvi. 115.

ascertained, the older statements all being more or less below the above. But for medicinal use, I have no doubt, it would even be less adapted than a chloroform of the specific gravity 1·49 to 1·495, which has been adopted in all recent pharmacopœias, since it is most likely more prone to spontaneous decomposition than the officinal, which, exposed to direct sunlight, contains free muriatic acid in a short time, even though it be prepared from pure alcohol.

It is not improbable that in certain localities chloroform may be prepared from very impure alcohol, and, in consequence of careless purification or rectification, may contain chlorinated compounds decomposing even more readily than chloroform itself. I believe, however, with Schacht, that a constant boiling point is a very good, perhaps the best criterion for the purity of chloroform. Schacht experimented with a chloroform of 1·4960 sp. gr., and a boiling point of 67° C. (152·6° F.) I have in my possession a sample of sp. gr. 1·4840, at 66° F., which was rectified in July, 1865, and had been kept during this time in diffused daylight, in a well-corked and perfectly dry bottle, without acquiring the slightest acid reaction. Exposed to the direct sunlight, it showed after two days no free acid. Tested with an equal bulk of oil of vitriol, it imparted to it after 24 hours an extremely faint yellowish color. Evaporated from filtering paper, no difference in the odor was perceptible.

It may be inferred from this that chloroform of 1·4840 sp. gr. will keep well in diffused daylight, and, at least for a limited time, also in direct sunlight. One pound of this chloroform was re-rectified by distillation. Introduced into a glass retort and suspended over a carefully regulated gas flame, a false boiling commenced as low as 62·2° C. (144° F.), and the greater portion distilled over at this temperature, when the distillation was stopped, and the distillate returned to the retort. This false boiling proceeded from two or three points in the bottom of the retort, from whence minute globules of vapor arose, which finally burst above the surface of the liquid, when distillation commenced.

In the second experiment with direct heat, the temperature

was pushed far enough until active boiling commenced, and it now vacillated between 66° and 67° C. (151° and 153° F.)

The distillate was again returned to the retort, and heated in a water-bath, the whole of the chloroform being immersed. Carefully heated, the temperature in the retort rose to 69° C. (156° F.) without the slightest sign of boiling. Some fragments of glass were dropped in, when it boiled violently for a few seconds, the mercury at the same time receding, after which the boiling continued, the thermometer varying several times between 64° and 64·5° C. (147° and 148° F.) After boiling ceased, a few drops remained in the retort, which immediately imparted a yellowish-brown color to sulphuric acid, while the distillate was without reaction even after prolonged contact.

This chloroform had been prepared by the process given above, from good ordinary alcohol of 95 per cent. by volume, not entirely deprived of fusel oil.

A sample of chloroform obtained from a manufacturer had the specific gravity of 1·484, was free from reaction on litmus, and scarcely affected sulphuric acid. It behaved to the direct and diffused sunlight precisely like the one mentioned before. This chloroform was rectified by very slow distillation over chloride of calcium, and the distillate collected in fractions of three ounces each. Sulphuric acid was avoided, because it has been supposed by some to induce decomposition. Some chloroform prepared by myself was properly reduced by the addition of alcohol, and then rectified in the same manner over chloride of calcium.

The fractions varied in specific gravity from 1·478 to 1·494, and all were uniformly exposed to sunlight for one day, when some of the heavier (1·480 to 1·484) were found to be acid, while other fractions of the same gravity retained their neutral behaviour to test paper. On examining the bottles a slight condensation of moisture was observed above the acidified chloroform, while the samples retaining their neutral reaction were free from it. This latter chloroform was now emptied into damp bottles and exposed to the sunlight for about three hours, when litmus was instantly colored red, and in the course of a few seconds entirely bleached. Both chloroforms behaved precisely alike.

It appears from these experiments as if the presence of moisture, however slight, predisposes chloroform of sp. gr. 1·480 to 1·484 to a rapid decomposition; and if this is really the case, we can readily understand that chloroform of a higher specific gravity, if filled in damp bottles, will very rapidly change under the influence of light. This moisture condenses above the chloroform, and, absorbing the chlorinated products of decomposition (free chlorine?), separates in the form of yellow drops.

The same chloroform, reduced to the specific gravity 1·459 to 1·476, kept unaltered in the presence of moisture after a week's exposure to the sunlight.

It is due to my friend, Mr. Augustus Henkel, now of Cincinnati, to state that quite a number of the experiments referred to above were either made or verified by him during the summer of 1865.

The observations and experiments with chloroform have been quite numerous since my attention, about three years ago, had been directed more particularly to its ready spontaneous decomposition, to which, contrary to the direct and indirect statements of Städeler, Hager and others, chloroform prepared from good alcohol is subject if its density exceeds a certain point. These statements do not attempt to prove that chloroform prepared from other material is alone subject to decomposition, but merely assert that, made from alcohol, it was found to keep well, which fact may be readily explained by low specific gravity and absolute dryness. My own observations prove that this tendency to change increases with the specific gravity, or, in other words, with the absolute chemical purity of chloroform, and the total absence or the presence of minute quantities of those compounds imparting a brown color to sulphuric acid, do not appear to make any difference whatever. The few observations made on this point seem to indicate that moisture will hasten the decomposition in the light.

The practical results derived from the foregoing are as follows:—

1. Chloroform of sp. gr. 1·475 and less will keep in dry or damp bottles, in diffused daylight and direct sunlight.

2. Chloroform of sp. gr. 1·480—1·484 will remain unaltered

in diffused daylight, and (for a limited period, at least) also in sunlight, if free from moisture; in the presence of moisture decomposition will set in, if exposed to sunlight.

3. Chloroform of 1·490 sp. gr. and above can be kept unaltered *only* in the dark; if decomposition should take place in the dark, it must have *commenced before* the total exclusion of light.

In view of these facts, there are but two ways for preserving chloroform for medicinal use: either to keep it totally excluded from the light from the moment it has been rectified, if the officinal specific gravity is adhered to; or to reduce it to about 1·475 by the addition of alcohol, as I have suggested heretofore.

The former alternative, I believe, has been adopted by several governments in Europe, where the pharmacist is now compelled to preserve it in dark closets and in black bottles, impervious to light.

In our country this care would scarcely appear to be necessary, since very few pharmacists rectify the chloroform they use in their practice, but rather leave it to the large manufacturer, who, to judge from specimens obtained without selection at various times from different sources, aim to get it of such a density that light has no effect on it. In my experience, the purified chloroform met with in our commerce is generally below 1·48; its density occasionally approaches 1·49, which point it very rarely exceeds.

A case has been related to me of the shipment to California of a considerable quantity of chloroform, a number of years ago, which arrived there in a damaged condition in consequence of spontaneous decomposition. This and similar occurrences may have directed the attention of our manufacturers to this point at an early date, and suggested to them the necessity of reducing the density of their product.

The rectification of chloroform, if intended for internal use, ought never to be omitted by the pharmacist. Our pharmacopœia allows the presence of a minute proportion of those compounds which react upon sulphuric acid, and upon careful examination but very little chloroform will be found in our market which is totally free from these compounds,—a fact which will be revealed

by a careful distillation, leaving about one or two per cent. in the retort, which will almost always react very decidedly with concentrated sulphuric acid. This is due to the difficulty of destroying these compounds by sulphuric acid in operations on the large scale, which is completely effected only by very prolonged contact, and then probably—at least the last portions—with difficulty. If chloroform treated in this way is afterwards carefully rectified, the last portions of the distillate will usually react with sulphuric acid.

A re-rectification is easily accomplished, and without much trouble. The chloroform is introduced into a glass retort together with a wire coil, a thermometer is inserted, and the retort placed in a water-bath, which is rapidly heated until the chloroform boils, when the heat is sufficiently reduced so as to keep the temperature at about the same point, taking care not to let it rise above 67° C. (153° F.) The boiling point of chloroform varies with its density, and from accidental causes. Liebig states that chloroform of 1·480 sp. gr. boils in a dry retort at 60·8° C. (141·5° F.), but in the presence of water at 57·3° C. (135·14° F.) If the temperature is in no case allowed to rise over 67° C. (153° F.), the last portions of the foreign impurities are left behind, which, if present in minute proportion, may not be positively injurious, but which possess such a suffocating odor that their complete removal is at least very desirable. The temperature suggested here is a few degrees less than that recommended by Hirsch, but is sufficiently high for the distillation of pure chloroform.

For some time past I have, for reasons stated before, reduced the chloroform to the specific gravity 1·475. If 95 per cent. alcohol, in sufficient quantity for this purpose, is added to chloroform of a higher density, the mixture turns milky; and if it is now subjected to distillation even in the presence of dry carbonate of potassa, as directed by the pharmacopœia, a considerable and varying proportion distils over at first in a milky condition, and contains all the water, notwithstanding this liquid boils at about 33° C. (60° F.) above the boiling point of chloroform. The milkiness of the mixture is caused by the separation of water in minute globules; and, if it is allowed to rest, this water

will soon rise to the surface, and may now be removed without trouble by means of a separatory funnel. This is by far the easiest method for reducing chloroform to any given specific gravity. Even if the pharmacopœia in a future revision should adhere to the purification of chloroform by means of concentrated sulphuric acid, it will be advisable to rectify this chloroform *per se* after the adhering acid has been removed by an alkali, and subsequently dilute it with alcohol, separating the water after it has collected on the surface.

I have never experienced any difficulty in regenerating chloroform which had acquired an acid reaction. Such chloroform was always made from ordinary alcohol, and had previously been rectified. If such an acidified chloroform was agitated with a solution of carbonate of soda, and subsequently distilled over a little unslaked lime, it was always obtained of an unexceptionable reaction. The same result was arrived at by diluting the chloroform with some alcohol, agitating them well together, and filtering the turbid mixture at once through a plain filter, covered with a quantity of dry carbonate of potassa. Chloroform regenerated in this way, and diluted to the specific gravity of 1·475, has kept in the diffused daylight, and even exposed to sunlight, without any perceptible change. If chloroform is prepared from other material than alcohol, the regeneration may probably be more difficult.

A slight acid reaction in chloroform is not readily ascertained by holding a piece of litmus paper in it, since the coloring matter of litmus is utterly insoluble in this liquid. The most minute acid reaction is best observed by evaporating spontaneously a few drops of chloroform with a drop of an aqueous solution of litmus, properly neutralized. A minute trace of acid will then change this color to a reddish tint, and no acid will be lost by and with the evaporation of the chloroform, since the aqueous litmus floats on the surface, just in the place where it is best calculated to absorb any acid which may be present.

Chloroform, I believe, is best kept in cork-stoppered bottles; it has no influence upon the cork, but, if it should acquire free acid, this would soon show itself by imparting to the lower end of the cork a yellow color, and softening its texture so that it readily crumbles to pieces when rubbed between the fingers.

ENNOMOS SUBSIGNARIA, OR THE MEASURING-WORM.

By Allen Shryock.

(An Inaugural Essay, presented to the Philadelphia College of Pharmacy.)

Class *Insecta*. Order *Lepidoptera* (Linn.) Tribe *Geometra* (Hübner).

General Characteristics.—Head roundish, furrowed above, and of a pale red color. The male and female are furnished with ten legs; six in front, which are horny and jointed, tapered, and placed beneath the first three rings of the body. The remaining four are placed beneath the extremities, and are thick, fleshy and jointed. The body is from six to twenty lines in length, and slate-colored. The imago is pure white on the upper side, with slight brown tips on the upper surface. The females are longer in body and wings, and are rather lazy. Both male and female have full use of their wings. The male antennæ is pectinated underneath to the tip; the female antennæ is filiform, notched beneath.

About the end of the first week in July the female deposits her eggs, usually numbering about fifty or more, upon the lower bark of the trees upon which they feed. They are most generally seen upon the different species of maple, but at times they are seen upon our fruit trees. After depositing these eggs they die, and by the middle of the next June the eggs are matured into the larvæ, which suspend themselves from the upper branches of the trees by a silk cord in the warm sun, which is their delight; at night they draw in the cord. They cause great havoc among the leaves. When in danger they remain for several hours in the same position, resembling the twig to which they are attached.

The tribe derives its name Geometra from the fact that its members measure (as it were) the ground over which they pass. They cast their skin several times during the season. The male larvæ of this particular type are the smallest, and most active. They are most abundant in large cities, in which they are justly regarded as a great pest; in the country they are much less common, as they are soon devoured by the birds. I have seen some few upon the oak in the south-central part of our State.

About the last of June they commence preparing for the change to the chrysalis state, previous to their final transformation, by weaving a cocoon among the leaves, in which they remain until the beginning of July. The chrysalis is about seven and a half lines in length; the body is rough and obtused before, and is acute behind, armed with six brown hooks. The case of the antennæ and wings are well marked, of a pale brown color, and are fastened by silken threads to the leaves. The imago appears as a white moth; the wings expanding about eighteen lines.

This species is sometimes called *Geometra niveo-sericearia*, or the snow-white silky geometer. The female is impregnated from two to five days after her emergence, and is quite inactive after delivery. The males live several days afterward. The eggs are of a green color, insoluble in water; they remain on the bark of the tree till the next June. They are about half a line in diameter, and at this time are of an olive color. They are compressed at the upper end, and are closed by an oval flattened lid.

Two parasitic insects feed upon these larvæ:

I. The Ichneumon fly, described by Guy in the first volume of the Boston Journal of Natural History;

II. The *Cryptus conquisitor.*

These worms are a great annoyance, not only with regard to the havoc which they cause among the leaves, but in consequence of the peculiar manner in which they suspend themselves; they are continually dangling in our faces, or cracking beneath our feet. Many remedies have been suggested for ridding our cities of these insects. The most efficient way is to shake the trees well when the caterpillars are in a state of suspension; or apply a mild alkaline solution upon the bark of the trees, which loosens the eggs, that are glued to the bark by a kind of fluid, ejected with them at the period of delivery.

Properties.—The larvæ are cineritious in color, very much wrinkled when dry. The head of a red color. The powdered larvæ are chocolate-colored, possessing a fœtid narcotic odor, also a slight bitter taste. Having treated the powder of the dark worms alone with various solvents, I give the following results:—

It is extremely soluble in glycerin, to which it imparts a rich amber color, and forming a perfectly transparent solution. It possesses a powerful fœtid odor, also a burning taste.

Diluted alcohol will not preserve them.

It is partially soluble in alcohol, to which it imparts a rich green color, a nauseous taste, and a characteristic odor.

It is slightly soluble in ether, imparting a perfectly clear amber color, but to which it yields no taste.

It is slightly soluble in chloroform, with which it forms a clear yellow solution, also tasteless. It is also sparingly soluble in fixed oils.

The epidermis is wholly insoluble in any of the above menstrua.

Chemical Properties.—The *Ennomos subsignaria* contains many interesting principles, but, being restricted to a very small amount of matter, my experiments have been very limited at present. Thus far I have found it to contain, 1, a crystalline principle; 2, a volatile oil; 3, a fixed oil; 4, a green coloring matter; and 5, a black coloring matter. There are also slight traces of tannic acid.

The crystalline principle is obtainable from the powdered worm. Having packed some in a glass funnel, percolate chloroform through it until the solution is colorless. Then set it aside to crystallize. One hundred grains of the powder yields about two grains of the crystalline matter. This, when obtained, is of a white color, both inodorous and tasteless; it is soluble in water, alcohol, ether and chloroform. To this crystalline matter I would give the name of subsignarin, as it is a neutral principle; its solution yields a light precipitate with tannic acid, acetate of lead, and bi-carbonate of potassa, turning cloudy on the addition of ammonia; no alteration perceptible upon the addition of iodohydrargyrate of potassium, nor with solutions of bichloride of platinum, sulphate of copper, or sulphate of zinc. There appears to be no change on the addition of nitric, hydrochloric or acetic acids; sulphuric acid forms a cloudy solution.

The volatile oil is obtained in the process of extracting the subsignarin; it is retained in solution by the chloroform, and is left as a residue after crystallization has been effected. It leaves a greasy stain upon paper, which may be removed on the addi-

tion of heat, thus proving its volatile character. It retains the narcotic odor of the worms, is amber colored, and also possesses an extremely bitter taste. It is very soluble in alcohol, and is of less density than water. It turns white and cloudy on the addition of nitric, hydrochloric or acetic acids; no precipitate with a solution of bichloride of platinum, ammonia, or sulphuric acid. Iodo-hydrargyrate of potassium produces a yellowish-white color.

The fixed oil may be separated by distilling the volatile oil with which it is impregnated; when cold it is semi-solid, and of a yellowish color. It leaves a stain on paper, not effaceable by ordinary heat.

The green coloring matter is most probably the same as that contained in the leaves of the tree upon which they feed,—chlorophyl.

The black coloring matter produces a stain when the worm is crushed beneath the feet, but it is entirely lost by age. There is a great deal of matter not soluble in the above-named menstrua, as the head, legs, epidermis, &c.

Medical Properties, Uses, and Doses.—Ennomos subsignaria, in any of the above forms, acts as an emetic in large doses; in much smaller ones as a slight narcotic, diuretic, and antispasmodic. The dose of the powder as an emetic is from ten grains to a half-drachm. In doses of from two to eight grains, two or three times daily, as a narcotic and diuretic. The dose of the oil is from two to five drops, to which it owes its emetic properties. The taste is retained in the mouth a considerable time after taking. The crystalline principle, which is tasteless, may be taken to the amount of one or two grains.

This agent might prove useful in diseases of the urinary organs, or derangement of the nervous system.

There are many tribes of the order *Lepidoptera* which are very poisonous, even to the touch, but this particular tribe *Geometra* seems to contain none of these properties. They are eaten by our common fowl, *Phasianus gallus*, to a great extent, and seem to produce no evident effect.

ON FRAZERA WALTERI (AMERICAN COLUMBO).

By Frank W. Thomas.

(Abstract of an Inaugural Essay.)

The *Frazera Walteri* is an herbaceous perennial plant, belonging to the Gentianaceæ. It varies in height from three to eight feet, has an erect stem, and has its leaves verticillated in whorls. The flowers are large and numerous, in a terminal panicle. The fruit is an oval flattened capsule, containing from four to twelve seeds.

The root, which is the part used in medicine, is fleshy, horizontal, and spindle-shaped, with but few lateral fibrous radicles. It has very little odor, and a sweetish bitter taste. The *Frazera* is indigenous to the western States, and is rarely seen east of the mountains, and prefers rich and moist lands.*

The author's aim has been to determine whether the tonic properties of American columbo are due to principles similar to those in the true columbo root.

A cold infusion of a pint from two ounces of the powdered root, by percolation, possessed a bright reddish-brown color and agreeable bitter taste, and a decided acid reaction. It was not affected by solution of corrosive sublimate, or by tannin, nor was its transparency affected by heat, and contains no albumen; but it is abundantly precipitated by subacetate of lead.

Tincture of iodine produced no blue coloration when added to a decoction of the root after cooling.

When 500 grains of the root was digested in water fourteen hours, and the infusion acidulated with sulphuric acid, and then precipitated with ammonia, a whitish granular powder was obtained, tasteless and insoluble in alcohol, ether and water, and unaffected by a high heat.

The root yields pectic acid by the successive action of carbonate of soda and hydrochloric acid.

The ethereal tincture had a bright yellow color, and slightly bitter taste. This, on evaporation, yielded a fixed oil, resin, yellow coloring matter, and a wax-like substance insoluble in alcohol.

* [We have seen it growing in great luxuriance on the bottom lands bordering the Ohio river above Wheeling, on the Ohio side.—Editor.]

The author, by distilling several portions of root with the same water, obtained an odorous liquid, entirely transparent, and not rendered milky by chloride of sodium, though less transparent. No particles of oil separating on standing.

A hydro-alcoholic tincture, on evaporation to dryness, was dissolved in six fluidounces of water, and the solution treated with subacetate of lead until it ceased to produce a precipitate. When the filtered liquid was deprived of lead by sulphuretted hydrogen, and evaporated, a residue of pure bitter extract remained.

A concentrated tincture, made with alcohol sp. gr. ·817 from eight ounces of the root, when reduced to four fluidounces by distillation, and set aside, deposited numerous acicular crystals of a bright yellow color, arranged in clusters, inodorous, agreeably bitter, insoluble in water, sparingly so in cold alcohol, but freely in alcohol when hot. These crystals, when laid on moist litmus paper, reddened it decidedly. Nitric acid dissolves them, producing a blood-red solution. They are not acted on by hydrochloric acid, but sulphuric and chromic acids both decompose them.

When the root was treated by the process for berberina, it did not afford an alkaloid, but only a resinous, acrid, bitter substance, insoluble in water, but soluble in alcohol and ether.

The alcoholic extract contains saccharine matter, and the ashes contain potassa, lime, magnesia, and oxide of iron.

From these results it is evident that *Frazera* is constituted quite differently from Columba, containing neither albumen, starch, nor berberina.

GLEANINGS FROM GERMAN JOURNALS.

By Prof. John M. Maisch.

On the Detection of Strychnia. Rieckher has isolated strychnia from a mixture of the heart, liver and lungs of a steer which had been kept in loosely covered bottles for eleven years and five weeks, and undergone putrefaction during that time. He gives the following results of his investigations:

1. The presence of strychnia may be proven by its intensely

bitter taste; by the yellow crystalline sparingly soluble precipitate with bichromate of potassa, and by the intense violet color of the chromate of strychnia, produced by concentrated sulphuric acid.

2. A proper modification of the process of Stas and Otto consists in the substitution of ether by benzin or chloroform for dissolving the strychnia.

3. Dragendorff's observation is corroborated, that acidulated dark colored aqueous solutions yield some of their coloring matters to benzin, but strychnia is dissolved by this menstruum only after the addition of alkali in excess.

4. Benzin or chloroform is readily recovered by distillation; amylic alcohol—recommended by v. Uslar and Erdmann—must be evaporated.

5. To detect strychnia in different mixtures, the methods of Stas and Otto are recommended; the use of subacetate of lead and sulphuretted hydrogen is to be avoided.—*Neues Jahrbuch f. Pharm.* 1868. *Jan.* 1—9.

Reduction of Chloride of Silver. Dr. Græger recommends for this purpose to dissolve the silver in ammonia and add from time to time some pieces of zinc; the gray powder is washed and digested with concentrated muriatic acid until it becomes whitish, when it is washed with distilled water and a little ammonia, whereby it becomes perfectly pure. Nitrate of silver in ammoniacal solution is reduced by the same process; if it contains copper, it is advisable to leave a little silver solution, so as to avoid the precipitation of copper.—*Ibid.* 9—14.

Testing Vinegar. W. A. Herb has constructed an acetometer, consisting of a small tube for measuring the requisite quantity of vinegar, and a burette to be used with clear lime water; every 10 degrees of the burette indicate 1 per cent. acetic acid.—*Ibid. Febr.* 89—92.

The constituents of Tormentilla have been examined by Rembold. The tormentilla red has the same composition as rhatany red; it is obtained by boiling the tannin of tormentilla with sulphuric acid, and appears to be identical with the red of chestnuts, since, on being fused with caustic potassa, proto-catechuic acid and phloroglucin are formed. Kinovic acid is obtained from

the root by boiling it with milk of lime and adding muriatic acid to the decoction. The precipitate is boiled with a solution of baryta, the filtrate decomposed by muriatic acid, the precipitate dissolved in alcohol, decolorized with animal charcoal, and the alcohol partly recovered by distillation, when kinovic acid separates as a crystalline powder.—*Annal. d. Ch. und Ph.* cxliv, 5.

Gentian for Bougies. Prof. F. Winkler, of Rostock, recommends gentian as a dilatatory of the vagina and uterus, and for various other purposes. It is cheap, may be obtained of any required thickness, does not swell excessively, and does not acquire a disagreeable odor if impregnated with mucus and pus.—*Deutsche Klinik*, 1867. *No.* 29.

Charta Sinapinata of Rigollot. Sized paper is covered with a solution of caoutchouc in bisulphide of carbon or with a thin solution of resin. It is then covered with fine, well-dried powder of black mustard deprived of its oil, and passed between two cylinders. Rigollot's paper has a stratum of mustard ·7 millimetres in thickness, which adheres well and does not peel off on bending.—*Pharm. Central Halle*, 1867. *No.* 38.

Opodeldoc Chloroformatum (*Linimentum saponato-chloroformatum*): ℞ Saponis butyrini sicci, p. 2.
Solve digerendo in Alcoholis fort., p. 20.
Liquori filtrato adde chloroformi, p. 3.
—*Ibid.* *No.* 41.

Pure Carbonate of Lime is obtained by Dr. Græger by slaking burned lime and digesting it with a solution of nitrate of ammonia, leaving the lime somewhat in excess. The liquid contains only nitrate of lime and free ammonia, none of the impurities found in lime being dissolved. Carbonic acid gas, if passed through the solution, precipitates pure carbonate of lime as a dense crystalline powder. It is advisable to add to the liquid a little carbonate of ammonia before filtering it. The filtrate is neutralized with nitric acid, if necessary, and serves again for dissolving burned lime. The only expense occurs from the generation of carbonic acid.—*N. Jahrb. f. Ph.* 1858, *March*, 158.

Vaccination a Prophylactic against Cholera. Dr. H. Otto, of Buckau, near Magdeburg, recommends vaccination with the

virus of cow's pox as the surest prophylactic against cholera. The town of 8000 inhabitants was visited by the small-pox from December, 1865, to July, 1866, and by the cholera from August 25 to October 10, 1866, with 550 cases and 160 deaths from the latter. Children, up to three years of age, once vaccinated, remained free from cholera; not a single case of cholera occurred amongst those vaccinated the same year, or who had been attacked by variola or varioloids. The fact is certainly remarkable that amongst 500 persons, revaccinated by Otto, not a single case of cholera occurred. "Vaccination with quassia as a prophylactic against cholera has not given the expected result."—*Pharm. Central H.* 1867, 343.

Detection of Ergot in Flour. Berlandt objects to the recognition of ergot from the odor evolved by the action of caustic potassa upon the flour, and recommends the decomposition of propylamin ($C_6H_9N = 2C_2H_4 + C_2NH$) into marsh gas and hydrocyanic acid as perfectly accurate. 1 part of the flour, 1 caustic potassa, and 6 water are introduced into a small flask, which is connected, first, with a chloride of calcium tube, and then with a combustion tube of 5 mm. diameter, placed in a combustion furnace; this tube is connected with a Liebig's potassa apparatus containing distilled water. The combustion tube is first heated to redness, then the flask is heated for half an hour, while the potassa apparatus is kept in ice. This liquid is afterwards mixed with sulphide of ammonium, evaporated to dryness and dissolved in little water. A few drops of this solution produce, with a drop of dilute sesquichloride of iron, a blood-red color, in consequence of the formation of sulphocyanide of iron.—*Archiv d. Pharm.* 1868, 382.

Copain Mège de Jozeau is prepared by adding concentrated nitric acid to copaiva until effervescence ceases; the mass is then washed with water to remove all acid reaction. Ten parts of this are mixed with one part each of cubebs, bicarbonate of soda and calcined magnesia, made into a mass with mucilage, and formed into oval pills, which are coated with colored sugar. (Ph. Cent. Halle, 1866, N. 52).

Sulphurous acid may be prepared, according to Franz Stolba,

by heating in a glass retort a mixture of 10 parts sulphur with 24 p. anhydrous proto-sulphate of iron. The gas is very pure; a little sulphur is readily separated by passing it through loose cotton, and the residue is useful for generating sulphuretted hydrogen; other metallic sulphates may be used in the same way. (Ph. Cent. Halle, 1866, N. 52).

Paraguay tea. D. A. Strauch has again analyzed these leaves, with the following results: theina ·450, volatile oil a trace, caffeotannic acid 20·880, gum 2·830, resin, chlorophyll and wax 5·902, starch 1·200, protein compounds 9·361, cellulose 22·148, apotheme 8·640, salts 3·896, water 8·100, sand and extractive. (Wittst. Viertelj., 1867, 167—182).

ON THE PREPARATION OF CHLORIDE OF POTASSIUM FROM THE CARNALLITE OF STASSFURTH, PRUSSIA.

By M. Stromeyer.

It is well known that the pure rock salt is covered in that neighborhood by a large bed of impure salt ("refuse" salt), in which are contained, besides many other interesting minerals, two substances in considerable amount, which are useful in the arts—kieserite, a sulphate of magnesia with one atom of water, and carnallite, a hydrated double salt of chloride of magnesium and chloride of potassium ($K\,Cl + 2Mg\,Cl + 12\,HO$). These two chlorides are united by so weak an affinity as to be readily separated by dissolving them in hot water, when, on cooling, the chloride of potassium crystallizes out, and the chloride of magnesium remains in solution. When, also, the double salt is drenched with a little cold water, or is exposed to moist air, the chloride of magnesium is dissolved out, and the chloride of potassium left behind. This double salt, which had been found by Liebig some time ago in the mother liquor of a certain saline, affords a very convenient material for the preparation of chloride of potassium. Chloride potassium has for some time been used in the conversion of the nitrate of soda from Peru into saltpetre, and for the manufacture of potash alum. It was obtained from the ashes of kelp, particularly at Cherbourg, in France, and at Glasgow, Scotland, and in large quantities at the sea-salt salines

of Camargue, in the south of France, by the process of Balard. It is, however, obtained from carnallite so much more cheaply that it already competes in Paris with the French article, and threatens entirely to supersede it.

Carnallite is found at Stassfurth in inexhaustible quantities. The superficial extent of the bed of "refuse" salt is estimated to be 450 square kilometres, in which the strata, consisting chiefly of carnallite (containing about 60 per cent.) has a thickness of 19 metres.

The small portion of the bed which has been opened at Stassfurth and Anhalt already assures to the business of manufacturing chloride of potassium an almost unlimited future. Unfortunately, however, the business has been driven with feverish speed—18 manufactories have been erected there—so that the demand for saltpetre and alum cannot absorb the production. It has therefore been necessary to seek other uses for it. What first presented was the conversion of the chloride of potassium into carbonate of potassa (potashes), which can be accomplished in the same manner as chloride of sodium is converted into carbonate of soda. The chloride of potassium may be changed to sulphate of potassa by heating it with sulphuric acid. This may then be roasted with carbonate of lime and charcoal, by which sulphuret of calcium and carbonate of potassa are produced, the latter of which may be removed by water. In the south of France a large amount of carbonate of potassa is obtained in this way. Sulphuric acid, however, is not used there to convert the chloride of potassium into sulphate of potassa, but this is done by means of sulphate of magnesia. The mother liquors of the sea-salt afford, by evaporation in the air, in the first place, an almost pure chloride of sodium, then a mixture of sulphate of magnesia and chloride of sodium, and finally a very impure chloride of potassium. Considerable quantities of the two last deposits are dissolved in boiling water, so that one atom of chloride of potassium comes into contact with more than two atoms of sulphate of magnesia; upon cooling, a double salt of sulphate of magnesia and sulphate of potash crystallizes out, in beautiful large crystals (MgO,SO_3+KO,SO_3+6HO), while chloride of magnesium is formed at the same time. This salt is decomposed

by further solution in hot water into sulphate of potassa, which crystallizes out, and sulphate of magnesia which remains in solution. This decomposition does not take place so readily as that of carnallite; at the same time, by two crystallizations, a salt containing 80 per cent. of sulphate of potassa can be obtained, which is rich enough to be roasted with carbonate of lime and charcoal.

This process may possibly be preferable, even at Stassfurth, to the treating of the chloride of potassium with sulphuric acid, since the chloride of potassium occurring there contains from 15 to 20 per cent. chloride of sodium and other salts, and therefore would afford a potash containing much soda, while by the French process the chloride of sodium is separated. The manufacture of potashes has not yet begun at Stassfurth, but Vorster and Grüneberg prepare a sulphate of potash of different degrees of purity for farmers. They keep their process secret, but, however, make use of sulphate of magnesia, which the kieserite (MgO,SO_3+HO) abundantly found there affords.

It is well known that plants need potash, which is, indeed, found in their ashes. Although it appears that most soils are richly charged with it, yet but little of it exists in such a form as to be readily assimilated by the plant. It exists generally in the soil as feldspar (silicate of alumina and potash), which is with difficulty attacked by the strongest mineral acids. By the action of the weather the potassa is of course extracted from it, but by a slow process. Formerly, when the land was left to lie fallow, this answered the purpose; but with the present increased population and more exhausting cultivation this will do no longer. Hitherto attention has been mainly given to the addition of nitrogen and phosphoric acid, but it will soon be necessary to restore to the soil the potassa also which has been removed from it.

A soil which has grown clover for some years soon yields a poor harvest. The ashes of clover, then, show but about one-tenth of their former proportion of potash, and a soil which had contained 13·4 parts potassa in 10000, then, has but 3 parts. In the cultivation of the sugar beet it has been often observed that, notwithstanding the liberal addition of phosphoric acid, the amount of sugar in the beet suddenly falls off, because the soil

had lost so much potassa. It is now not essential to put carbonate of potassa upon the land, although this occurs chiefly in the ashes of plants. A soil containing alumina and lime has the wonderful property of taking up sulphate of potash and chloride of potassium and rendering them insoluble in water, while the acids combine with the lime or magnesia in the soil. But since chloride of calcium and chloride of magnesium pass into the juice of the beet, and obstruct the clarifying of the sugar, it is better to apply the sulphate of potassa instead of the chloride of potassium, since the sulphate of lime thus produced does not have an injurious influence, but, on the contrary, is of advantage, since it affords to the plant the necessary sulphur, retains the ammonia, and changes the silicate of potassa in the soil into soluble sulphate of potassa. It is therefore to be desired that the application of sulphate of potassa may be encouraged, since the business at Stassfurth may thus be helped, and the deposit in that place become a blessing to agriculture.

Carnallite looks very much like rock salt, but is generally colored red by oxide of iron. When it is exposed to the air it deliquesces, and cannot therefore well be preserved. It is consequently stored in the mine, which fortunately is of ample dimensions. The quantity wanted in the factories is ordered day by day, and sent directly to the dissolving vessels, in covered cars by railway. A few manufacturers use the carnallite coarsely ground. The grinding is done under the care of the director of the mine, and large iron mills, like coffee mills, of four-tenths of a metre in diameter are used. One such mill in 24 hours will grind about 30 tons, of 1000 kilogrammes each. A sample is taken from each car load, and its percentage of chloride of potassium ascertained. The factories received in 1864, from the two mines at Stassfurth and Anhalt, 125,000 tons of carnallite, which had the following average composition :

Chloride of potassium,	17·5 per cent. (15—20.)
Chloride of sodium,	22·
Chloride of magnesium,	23·5
Sulphate of magnesia,	9·
Water,	28·
	100·

The selling price varies according to the amount of chloride of potassium. A salt containing 18 per cent. is called rich, one of 15 per cent. is of common quality. In 1865 the rich salt cost, in lumps, 21 francs 25 centimes per ton; the common, 23 francs 15 centimes.

These prices lasted for some months, when a reduction of two francs took place. By later accounts, the Prussian government, in accordance with that of Anhalt, have reduced the price of the average salt in lumps to 12 frcs. 50 cent. (1866).

Only the chloride of potassium has as yet been obtained from the carnallite; the chloride of magnesium is lost. The process consists of the following operations:

1. The treatment of the carnallite with hot water in sufficient quantity, by which chloride of potassium and chloride of magnesium are chiefly dissolved, and the largest part of the chloride of sodium and sulphate of magnesia remain undissolved.

2. The crystallization of the chloride of potassium by cooling.

3. The evaporation and cooling of the mother liquors, by which a second crop of crystals of chloride of potassium is obtained.

4. Further evaporation and cooling of the mother liquors, by which a double salt of chloride of potassium and chloride of magnesium is obtained ($KCl+2MgCl+12HO$). This is then treated as the natural salt.

5. Washing, drying and packing of the chloride of potassium.

The chloride of potassium purified by washing is quickly dried in an oven, where it undergoes a slight calcination, or upon the metallic floor of a chamber which is heated by tubes, through which the hot air from a coal fire is drawn.

After drying, the salt is collected, sifted, and packed in casks holding about 500 kilogrammes. They are loaded in the factories upon the cars of the Magdeburg Railroad, and sent to the different European markets.

The whole number of factories of Stassfurth and Anhalt produced, in 1864, 16,500 tons of chloride of potassium.

In the beginning of 1863 100 kilogrammes of chloride of potassium of 80 per cent. were worth, at Stassfurth, 40 francs. In the early part of 1865 the price had fallen to 29 francs, and by the end of the same year to 18 francs 70 centimes.

It is very evident that the production of chloride of potassium at Stassfurth will soon make competition with it impossible, and that the markets of Europe will be chiefly, if not exclusively, supplied from thence.—(Condensed from an article by Stromeyer, in *Dingler's Polytechnisches Journal*, vol. clxxxi, p. 376, for Am. Jour. Pharm.—G. J. S.)

CHLOROFORM NOT DECOMPOSED BY SUNLIGHT.

By Dr. H. Hager.

In previous volumes of the "Pharmac. Central Halle," I have repeatedly expressed my doubts regarding the decomposition of chloroform by sunlight; I have also stated, that the decomposition of chloroform has been observed when daylight was excluded, and that the cause of this spontaneous decomposition is to be looked for only in the presence of higher chlorine substitutions. This last view is perfectly justified by the fact that this spontaneous decomposition has been observed only in chloroform of very high specific gravity.

After the decomposition of chloroform had thus been repeatedly reported, I was surprised by the order of the Prussian Ministerium of July 9, 1867, requiring the chloroform to be kept not only in blackened bottles, but likewise in a dark place. I was induced to make several experiments, which gave the following results:

1. Chloroform of 1·490—1·493 spec. grav. is neither altered or decomposed by diffused or direct sunlight, between 16° and 18° C.

2. Chloroform of the same gravity, in contact with air, is not altered either by direct or diffused sunlight.

3. Chloroform of a higher specific gravity than 1·495, in contact with air, has a great inclination to decomposition, which, at a temperature of about 20° C., proceeds gradually in the dark, but more rapidly under the influence of direct sunlight.

The experiments which warranted these conclusions were performed by keeping several commercial specimens of chloroform in white glass bottles, entirely and partly filled, in the dark, in diffused daylight, and in the direct sunlight.

Chloroform of 1·490 to 1·492 spec. grav. did not show the slightest alteration under these circumstances. The influence of the direct sunlight could be had almost without interruption from 9 A. M. to 5 P. M. These specimens of chloroform were unaltered after an insolation of three weeks, in the filled as well as half-filled bottles; likewise in the bottles kept in the dark and diffused light.

Chloroform of spec. grav. 1·496—1·499, directly exposed in half-filled bottles, began to show the decomposition already on the second day, for a glass rod, moistened with ammonia, produced white clouds, particularly on the bottle containing chloroform of 1·499. On the third day, the vapor of this chloroform was so irritating that an examination by smelling could not be risked. The same chloroform, in entirely filled bottles, showed only, after five days' insolation, an alteration recognizable by its odor; and this may be explained by the insufficient exclusion of the oxygen of the air, since the bottles had repeatedly been opened to be examined. A small bottle was completely filled with warm chloroform of 1·499 spec. grav. and then hermetically closed. After an insolation of eight days it showed not the slightest alteration, which, however, commenced the day following the opening of the bottle.

The specimens kept in diffused daylight and in half-filled bottles differed from the above, for only that of 1·499 spec. grav. showed, after three weeks, an alteration and incipient decomposition.

Of the specimens kept in the dark in half-filled bottles, the chloroform of 1·496 spec. grav. showed an unimportant acid reaction, but strangely not the chloroform of 1·499 spec. grav. But a sample of the same, kept with the same precaution at a temperature of about 20° C., was in the state of complete decomposition. The specimens filled warm into bottles and these hermetically sealed, were all unaltered.

A sample of chloroform, which had undergone spontaneous decomposition, but had been restored as well as possible by treatment with carbonate of alkali and repeated rectification, underwent decomposition in half-filled bottles after an hour's exposure to the sunlight; even after keeping it in a cool dark

place for two weeks, it was undergoing complete decomposition.

The decomposition of chloroform of high specific gravity, according to these experiments, appears to be caused by the oxygen of the atmosphere. The gaseous products of decomposition in these cases were principally hydrochloric acid and chloro-carbonic oxide (COCl.)

Good chloroform, according to these experiments, is not decomposed in contact with the sunlight and air; therefore, the direction: "In vasis denigratis, bene clausis et loco obscuro caute servetur," is unnecessary for good chloroform of the officinal specific gravity, and troublesome to the apothecary. It has some value in regard to chloroform of a higher specific gravity, because its decomposition occurs sooner under the influence of light; but it is superfluous, because the decomposition of such chloroform is not prevented by the exclusion of the light. It would have been more correct to insist on the keeping, by the apothecaries, of chloroform of the officinal specific gravity, and thus to compel the druggists to sell only such chloroform.

It appears to me even very appropriate to adopt officially the reaction of the sunlight upon chloroform, for it is, without question, the surest test, which has only the single fault, that with us (in Berlin) it is scarcely practicable during the winter for the want of sunny warm days.

I disapprove entirely of the use of blackened bottles as shop bottles, because they are unsightly and require great care in filling and pouring out. They might be replaced by a more appropriate arrangement.

Whence and from whom the opinion or assertion originated, that chloroform is decomposed by the sunlight, I could not ascertain. But it came hardly from a competent source, and it is therefore to be regretted that it has received unqualified credit. —*Pharm. Central Halle*, 1867, 241—243.

Remarks.—In the essay, published in this number of the Journal, I believe to have shown that my experiments were made with pure chloroform, which Dr. Hager has *not* proven. Our summer temperature frequently exceeds 35° C. in the shade, and this difference in the temperature may account to a certain

extent for his different results. The best refutation of his opinion is to be found in the fact that a chloroform, which, in our latitude, will keep unaltered during the winter, will not keep during the summer, if of sufficiently high specific gravity; also that chloroform of a lower specific gravity will not stand the light and temperature of our summers, if its specific gravity is raised sufficiently by careful rectification over chloride of calcium; also that pure chloroform, kept over concentrated sulphuric acid, will decompose in the light, but not in the dark; and finally, that pure chloroform, which has a tendency to decompose spontaneously, will keep unaltered if its specific gravity is sufficiently reduced by the addition of alcohol. Notwithstanding I have now in my possession chloroform of 1·484 spec. gravity, which has kept unaltered in diffused daylight for three years, I advocate a reduction of the specific gravity of officinal chloroform to 1·475—1·480, because that—if otherwise pure—will withstand the decomposing influence of light and heat, as we experience it. Hager examined the chloroform with which he experimented merely by its odor and with a glass rod moistened with ammonia; I invariably tested for an acid reaction by evaporating the exposed chloroform spontaneously over a carefully neutralized solution of litmus, and whenever moisture had separated upon the chloroform, this was brought in contact with the litmus. In several series of experiments I added the solution of litmus directly to the chloroform, leaving the two liquids in contact during the experiment. J. M. MAISCH.

ON SYRUP OF THE PHOSPHATES OF IRON, QUINIA, AND STRYCHNIA.

ST. LOUIS, June 18, 1868.

Professor Procter:

DEAR SIR:—Some time since I had occasion to prepare Dr. Aitken's syrup of the phosphates of iron, quinia, and strychnia, and, although the operation was performed in strict accordance with the formula, as laid down in your journal, the result was far from being satisfactory, and gave subsequently much annoyance by the exceedingly objectionable instability of the preparation. The process, so far as preparing the aqueous solution

of the phosphates, presented no very serious obstacles, but the attempt at combining this with the sugar utterly failed. The solution of the phosphates, already containing some sugar, was filtered directly upon the remaining sugar contained in a bottle, and the mixture shaken occasionally until the sugar was dissolved. During this operation a dense and very permanent foam was formed, equal in bulk to the solution, and otherwise remarkable for the readiness and abundance in which it could be produced, even by slight commotion, and which, after filtration of the syrupy solution, remained without much diminution of bulk upon the filter for several days, and was then thrown away.

The liquid, during the solution of the sugar, deposited a bulky gelatinous sediment, which had at first a white appearance, but possessing, when more compact, a bluish tinge. The formation of this deposit seemed to be continuous, as, after repeated filtration of the liquid, the gelatinous precipitate still appeared, and, although accumulated in abundance at the bottom, the liquid above never became clear, as portions of the precipitate remained constantly disseminated throughout the whole.

This precipitation may have its limit when, after the greater portion of the iron has become insoluble, a highly acid salt still remaining in solution in the now superabundant excess of phosphoric acid. This view seems plausible from the fact that, after an abundance of the deposit has been removed, the subsequent formation of it is more moderate and somewhat different in character. For instance, on the liquid, which immediately after filtration is perfectly transparent and strongly exhibits the peculiar tinge characteristic for solutions of the quinia salts, a pellicle begins to form, which, when sufficiently heavy, breaks up, and the fragments floating about in the liquid are gradually deposited. But from the commencement no moderate excess of citric or phosphoric acid will prevent or redissolve the precipitate.

A portion of the syrupy solution before filtration, with the addition of more sugar, was heated, contrary to directions, with a view to avoid the production of foam, and to dissolve the deposit, but this only had the effect to augment the voluminous deposition.

A quantity of the syrup, later obtained from Mr. Aitken himself, and which was contained in dark bottles, exhibited the same bulky gelatinous deposit, the supernatant liquid being transparent and of a reddish-brown tinge. This comparison conclusively demonstrates that the ill success attending its preparation is the consequence of a fallacious formula, and not the result of unskilful manipulation.

Being recently called upon to prepare the syrup again, I proceeded in a somewhat different manner than the formula implies, although aiming at a result to be identical with that of the requirements. The first attempt was to procure an aqueous solution of the phosphates in a sufficiently concentrated state without heat—at the same time avoiding the unnecessary excess of phosphoric acid of the formula—that would admit of admixture with a sufficient quantity of syrup previously prepared, and form a syrup of greater density than that of the formula, and at the same time evading the formation of that persistent foam. The operations in view were to prepare the phosphates of iron and quinia without precipitation, thereby avoiding the oxidation of the protoxide of iron, and the unnecessary bulk of the solution consequent upon precipitation and re-solution. The phosphoric acid here employed is the monobasic or metaphosphoric (PO_5HO).

278 gr. of protosulphate of iron (FeO, SO_3 7 HO) will produce, with 358 gr. of phosphate of soda (2 NaOHO, PO_5 24 HO), 152 gr. of phosphate of iron (2 FeO, HO, PO_5), which contains 80 gr. of metaphosphoric acid; but to dissolve this 198 gr. more of metaphosphoric acid must be added, that is 278 gr. of metaphosphoric acid must be present to effect complete solution (Parrish, Roberts' Formula).

Therefore 1000 gr. of protosulphate of iron converted into phosphate of iron (546·76 gr.)

2(FeO, SO_3 7 HO) : 2 FeO HO PO_5 : : 1000 : ( )
278 : 152 : : 1000 : 546·76

requires the presence of 1000 gr. of metaphosphoric acid to retain it in solution. The iron in this solution is assumed to be in the state of superphosphate (FeO 2 HO PO_5). But the quantity of superphosphate of iron, 899·28 gr.,

FeO SO_3 7 HO : FeO 2 HO PO_5 : : 1000 : ( )
139 : 125 : : 1000 : 899·28

here represents only 575·54 gr. of metaphosphoric acid,

$$FeO, 2\,HO\,PO_5 : PO_5\,HO :: 899{\cdot}28 : (\;)$$
$$125 : 80 :: 899{\cdot}28 : 575{\cdot}54$$

which is all that is requisite to form a soluble salt; the remaining 424·46 gr. of metaphosphoric acid must therefore be excess.

To convert 1000 gr. of protosulphate of iron into superphosphate, 347·73 gr. of tribasic phosphate of lime, $3CaO\,PO_5$, also in the condition of superphosphate ($CaO\,2HO\,PO_5$, 787·44 gr.) must be employed for the removal of the sulphuric acid, as sulphate of lime ($CaO, SO_3\,2\,HO$).

$$CaO, 2\,HO\,PO_5 + FeO\,SO_3\,7\,HO = CaO, SO_3\,2\,HO + FeO\,2\,HO\,PO_5 + 5\,HO.$$

$$3(FeO, SO_3\,7\,HO) : 3\,CaO, PO_5 :: 1000 : (\;)$$
$$417 : 155 :: 1000 : 347{\cdot}73$$
$$3\,CaO\,PO_5 : 3(CaO\,2\,HO\,PO_5 :: 347{\cdot}73 : (\;)$$
$$155 : 351 :: 347{\cdot}73 : 787{\cdot}44$$

But 347·73 gr. of tribasic phosphate of lime already contains 179·47 gr. of metaphosphoric acid,

$$3\,CaO\,PO_5 : PO_5\,HO :: 347{\cdot}73 : (\;)$$
$$155 : 80 :: 347{\cdot}73 : 179{\cdot}44$$

so then only 820·53 gr. additional of metaphosphoric acid will be necessary to complete the required 1000 gr. In this 820·53 gr. of metaphosphoric acid, first dissolved in 5 f℥ of water, dissolves the tribasic phosphate of lime with the aid of heat; to the hot solution then add the protosulphate of iron in powder; when this has been dissolved and decomposed, filter to separate the insoluble sulphate of lime, and when the liquid has ceased to pass, wash the residue several times with small quantities of water. The filtrate now contains the whole of the iron as superphosphate, together with the excess of metaphosphoric acid.

Mr. Aitken's formula for 24 f℥ of the syrup, provides as follows:

Protosulphate of Iron, . . .	300 gr.
Phosphate of Soda, . . .	480 gr.
Sulphate of Quinia, . . .	192 gr.
Strychnia, ...	6 gr.
Sugar, ...	14 ℥
Diluted Phosphoric Acid, U. S., .	14 f℥

Accordingly, a solution of superphosphate of iron, representing 1000 gr. of protosulphate of iron, as above described, converted into a syrup of the phosphates, to represent the proportional quantities of quinia and strychnia of the preceding formula, would produce 80 f℥ or 5 pints of syrup, with the following requisitions:

Sulphate of Quinia,	640 gr.
Strychnia,	20 gr.
Sugar (as Syrup U. S. P. f℥ 57·04),	46⅔ ℥
Water, sufficient.	

All that remains now to complete the syrup is the conversion of the alkaloids into phosphates, and their incorporation with the iron solution and the syrup. To prepare the strychnia phosphate requires simply mixture with the iron solution, in which it readily dissolves. But in case of the quinia salt, as the formula precludes the combined sulphuric acid, this must first be removed, which is easily effected by conversion into sulphate of lime by double decomposition with a solution of superphosphate of lime. To accomplish this 75·84 gr. of tribasic phosphate of lime, in the state of superphosphate, is necessary.

$$3(N_2C_{40}H_{24}O_4, SO_3 8HO) : 3\,CaO\,PO_5 :: 640 :$$
$$1308 : 155 :: 640 : 75{\cdot}84$$

The tribasic phosphate of lime may now be dissolved in a sufficient quantity of a hot solution of metaphosphoric acid, the sulphate of quinia added and, after complete decomposition, filtering, and the filtrate mixed with the iron solution and the syrup. This operation of separately preparing the phosphate of quinia may be advantageously dispensed with, and the whole process much abridged by transforming the sulphate of quinia simultaneously along with the protosulphate of iron into phosphate, employing the necessary amount of tribasic phosphate of lime, in the condition of superphosphate, to render the decomposition of the two sulphates complete. This process is executed as presented below:

Protosulphate of Iron,	1000 gr.
Tribasic Phosphate of Lime,	423·57 gr.
Metaphosphoric Acid,	781·32 gr.
Sulphate of Quinia,	640 gr.

Strychnia, ...	20 gr.
Syrup, ...	O 4½
Water, sufficient.	

Dissolve the metaphosphoric acid in 5 f℥ of water, heat the solution, and add in succession the tribasic phosphate of lime, the sulphate of quinia, and sulphate of iron; after the last addition continue the heat for a few moments and filter. After washing the residue on the filter several times with small portions of water, add the strychnia to the filtrate, and when this has dissolved mix the solution immediately with the syrup.

Thus far the proposed process is a decided success, and an unquestionable improvement in every respect. The complete solution of the phosphates is effected with less than half the prescribed quantity of phosphoric acid. The oxidation of the protophosphate of iron is perfectly prevented (as oxidation by precipitating and washing is unavoidable) and the loss of quinia, by a similar process, is wholly obviated. Hence, practically considered, no loss whatever is incurred in the proposed process, as the crystalline nature of the residuary sulphate of lime permits of almost perfect removal of the dissolved phosphates with a comparatively small quantity of water. And subsequent loss is further avoided by the employment of syrup, thereby yielding a much denser product. But the characteristic feature that condemns this preparation as a failure is its proneness to deposition, which in either process is precisely similar, and in this respect the presence of sugar apparently exercises no preventative influence. The solution of the phosphates without sugar, and tolerably concentrated, retains its transparency for several days, but upon dilution with either water or syrup precipitation immediately occurs. It is very evident, by reverting to previous illustrations, that even a great excess of phosphoric acid does not possess the capacity to preserve the permanency of the solution. Then the direct inference is at once apparent that the excess is superfluous and altogether unnecessaay, and from an economical point of view may consequently be excluded from the formula. Then, after reconstruction, the formula for a solution of superphosphate of iron, containing 1000 gr. of metaphosphoric acid and free from excess of the latter, may be assumed as follows:

Protosulphate of Iron, . .	1737·49 gr.
Metaphosphoric Acid, . .	666·67 gr.
Tribasic Phosphate of Lime, .	645·83 gr.
Water, sufficient.	

The manipulations here are in all respects similar to those previously described. The result is a deep green, dense but mobile liquid, which remains permanent for several days, but then becomes subject to the same changes, which take place immediately when much diluted. Addition of excess of ammonia to this solution occasions a bulky greenish-white precipitate, which is again partially dissolved to an intensely green solution, but wholly upon exposure, and only after some time, to a dark-brown liquid. If the solution, previous to the addition of ammonia, has been acidulated with citric acid, no precipitate occurs, but a magnificent emerald green coloration is imparted to the liquid. A similar result is obtained by the addition of citrate of ammonia to the precipitate produced by the previous addition of ammonia to the liquid, but this is again considerably relieved by a sufficient excess of the citrate. If a strictly neutral or slightly acid solution of citrate of ammonia is added to the solution of superphosphate of iron, the transparency of the solution remains unaffected—an immaterial deepening of the color is the only apparent result. The mixture with a sufficiency of citrate of ammonia may be evaporated to a syrupy liquid, from which the dry double salt can readily be obtained in permanent light-green scales, readily and completely soluble in water, and possessing a sweetish pleasant saline, not metallic, taste. The solution of this citrophosphate of iron and ammonia, either with or without an excess of ammonia, will not bear evaporation in contact with sugar—the mixture speedily becoming intensely brown. But when containing no free ammonia it may be mixed with syrup in any proportion—an elegant light-green and permanently transparent syrup being the result. Now, if to the syrup of the phosphates, prepared in pursuance of the proposed formula, or if to the solution, before its admixture with syrup, a neutral solution of citrate of ammonia containing 1000 gr. be added, a beautiful light-green, dense, and permanent syrup will be obtained, which surmounts all those exceedingly

perplexing obstacles, and leaves nothing to be desired by even the most fastidious.

Very respectfully, yours, A. S.

IODINE AND CARBOLIC ACID.

By Charles Bullock.

A solution, containing iodine, carbolic acid and glycerin, has been introduced to the medical profession by Dr. Percy Boulton, who claims for it therapeutic virtues of superior efficiency.

Dr. Boulton's solution is prepared as follows:

℞ Tinct. Iodini Comp.,	. . .	♏ xlv.
Acid Carbolic Cryst. (fusa),	. .	♏ vi.
Glycerinæ,	. . . . .	℥ viii.
Aq. Destillat.	. . . . .	℥ v.

The iodine color gradually disappears, and the solution eventually becomes colorless. The time necessary to complete this change depends on the temperature—at 60° F. eight to ten days are required; if the cork of the bottle is secured and the mixture exposed in a water bath to a temperature of from 90° to 100° F. the change will be effected in eight or ten hours. The change takes place as quickly in diffused light as in direct sunshine, provided the temperatures are equal. The solution exposed to sunshine becomes somewhat turbid and deposits a muddy precipitate.

The change is due entirely to the carbolic acid, glycerin alone, under similar conditions, effecting no change in the iodine solulution, while carbolic acid acts equally well with or without the presence of glycerin.

The *character* of the change is probably the transformation of the iodine into iodide of formyle (iodoform) at the expense of the carbon atoms of the carbolic acid.

The solution possesses antiseptic and stimulant properties in a marked degree, and has met with favor as an application in the form of injections, gargles and lotions "in cases of sore throat, ozœna, abcesses in the ear, and foul or indolent ulcers."

It has also been recommended as an *injection* in cases of internal hæmorrhoides, and by inhalation for throat and bronchial affections. When used for inhalation the glycerin can be omitted.

Philadelphia, June, 1858.

GLEANINGS FROM THE FRENCH JOURNALS.

By the Editor.

Strong Liquid Glue.—M. Knaff (*Jour. de Pharm.*, Mai, 1868) gives the following recipe for a liquid glue: Take 3 parts of good glue reduced to little fragments, cover it with 8 parts of water, and allow it to remain during some hours; then add half a part of chlorohydric acid and three-fourths of a part of sulphate of zinc, and expose the whole during ten or twelve hours to a temperature of 178° to 189° F. A mixture is thus obtained which does not gelatinize, which keeps well, and is very convenient for pasting.

Santonin Lozenges.—M. Guyot Dannecy (*Jour. de Pharm.*, Mai, 1868) has observed that when these lozenges are prepared with the santonin in crystals, unpowdered, they are nearly tasteless. In avoiding all trituration in the process of mixing the ingredients, the patient takes them without repugnance; but when, on the contrary, the santonin is powdered in a glass or porcelain mortar, the lozenges are very bitter and disagreeable.

Perfumes.—M. Stanislaus Martin, in a letter to the Societé de Pharmacie (*Proces-Verbal*, Avril 1er, 1868), remarks on the use of perfumes in ancient and modern times as follows:

Perfumes played a grand part among the ancients. They were esteemed among the Greeks; in the East they were employed in all their sacrifices; and among the Gauls the Druids perfumed their altars with the labiateous plants, resinous woods and juniper berries.

In our day the East is one of the regions richest in odorous resins, and where an immense consumption of perfumes is made in China, Cochin China and Japan.

At Jeddo, in the numerous palaces of the Emperor, during the time of prayer they burn a wood which exhales a delicious perfume, but the name of the tree is unknown, because it has so many synonyms. The essential oil of this wood, of which I have the honor to present a specimen to the Society, has a sweet, tenacious odor, is rapidly diffused, and is excessively dear. M. Chardin Hadancourt, well known for his skilful knowledge of perfumes, has been unable to assign it a place among those already known.

So far, botanists have found but two vegetables which furnish camphor in quantity sufficient for its extraction,—the *Camphora officinarum*, and the *Dryabalanops camphora*, which grows in Sumatra.

The Chinese gather it on another plant, where it collects under the form of little clots at the bases of the leaves and at the bottom of the corolla.

The odor of this camphor differs but little from that of ordinary camphor, nevertheless it possesses some peculiarity when rubbed between the fingers.

This camphor is so scarce that its price equals nearly that of gold. The Emperor and the mandarins only enjoy the luxury of its use on their persons. If it could be imitated it would be a source of wealth.

Manufacture of tartaric acid from the marc of grapes.—The only source heretofore utilized for obtaining tartaric acid is the lées of wine casks. Messrs. Inette & Ponteves propose to employ the marc of the grape, and by the following process to remove the acid from the tartrate of lime it contains:

The pressed marc is submitted to an ebullition of some hours with about two per cent. of sulphuric acid, with the intention of liberating the tartaric acid; a portion of cellulose is transformed into glucose, and as the marc contains nearly always some sugar which has escaped fermentation, the liquid may be fermented, and alcohol obtained from it by distillation. The residue is saturated with lime, which produces the tartrate of lime, from which the tartaric acid is separated by known processes. The quantity of marc yielded by a million hectolitres of wine can, according to the authors, produce 200,000 kilogrammes (437,000 lbs.) of tartaric acid; the marcs of the south of Europe contain 3 to 4 per cent. of tartrate of lime.

It sometimes happens that the presence of magnesia or pectinous matters interfere with the decomposition of tartrate of lime by the sulphuric acid. It is then preferable to treat the marc with an alkaline carbonate, in the manner to produce carbonate of lime and an alkaline tartrate. To effect this double decomposition the marc is suspended in four or five times its weight of water, and a quantity of carbonate of soda added, so that

after three hours' ebullition the liquor shall be neutral; then by decanting the liquor, on standing it soon crystallizes.—*Rèpert. de Pharmacie*, Mai, 1868.

Compound syrup of coffee.—M. N. Severin, pharmacien of Brussels, to gratify a wish that he would give the formula for his *anti-rheumatic and gout syrup of green coffee and ash leaves*, has published the following in *Bull. Soc. Pharm. Bruxelles:*

Take of Mocha coffee (in its raw state) 40 troyounces.
Ash tree leaves (*Fraxinus excelsior*), 154 grains.
Distilled water, q. s. (about 10½ pints.)
White sugar, 26½ troyounces.
Phenic acid, liquid, 5 drops.

Pulverize the coffee, introduce it into a percolator of such size as to but half fill it, distilled water at 140° F., and maintain it at this temperature during 12 hours, and pour the liquor which passes on the sugar. Continue the percolation with distilled water at the same temperature, till the coffee is exhausted. Mix the last percolates, add the ash leaves, and evaporate until the liquid is so far reduced as to make with the first dense liquid and sugar a pint of syrup, which is to be filtered, and, after cooling, the phenic acid added.

Anilin inks.—The several anilin colors may be used as the bases of inks, according to M. Fuchs. To prepare red, blue, green, or yellow ink, use the corresponding anilin colors of commerce, in the solid state. Take 15 parts, for example, in a well enamelled vessel, and add 150 parts of strong alcohol; allow them to stand three hours, then add 1000 parts of rain or distilled water, heat the whole gently during several hours, until the odor of alcohol is dissipated, add then about 60 parts of gum arabic dissolved in 250 parts of water, and strain. As the anilin colors of commerce vary a great deal in quality, the amount of dilution must vary with the sample used, and the shade determined by trial.—*Repert. de Pharm.*, Mai, 1868.

Sulphates in filtering paper.—M. Kruger has stated that many filtering papers of commerce contain considerable quantities of sulphates, and that it is sufficient to repass the same distilled water several times to render that liquid capable of forming a sensible precipitate with nitrate of baryta.

M. Kruger thinks that the acid enters the paper from the water used in its manufacture as sulphate of lime, because it is not probable that it would be admixed mechanically and intentionally, as is done under the name of *annalin* in some kinds of paper. This sulphate of lime is not derived from the chloride of lime and sulphate of soda employed in bleaching, because no soda salt is found in these papers. Whatever be its source, it is important to guard against its presence.—*Journ. de Pharm.*, Avril, 1868.

Bleaching of palm oil.—M. Englehart bleaches palm oil thus: Take 1000 lbs. of palm oil, heat it to 144° F. in a boiler, and let it stand over night, and next day decant it into a clean vessel and cool to 98° to 104° F. In another vessel boil 45 pounds of water, dissolve in it 15 pounds of bichromate of potassa, and when partly cooled add 60 pounds of hydrochloric acid. This solution is then mixed with the palm oil, and agitated rapidly. In five minutes the color of the mixture becomes green, owing to the reduction of the chromic acid at the expense of the coloring matter of the oil. On continuing the stirring the oxide of chrome separates, and it is sufficient to wash the oil with water to get it perfectly white.—*Jour. de Pharm.*, Avril, 1868.

Trimethylamine in wine.—M. E. Ludwig states that the organic basic substance noticed in wine by M. Brucke he has proven to be trimethylamine, which he thinks is due to the decomposition of the ferment,—a source of this base pointed out by M. Muller. The author found this base in other qualities of wine, and inclines to consider it as a principle entering fermented liquors. M. Nickles says it has been suggested that it may exist in the grape, and arise from the animal manures used in its culture.—*Jour. Prakt. Chemie*, and *Jour. de Pharm.*

Solubility of plaster of Paris in solution of sugar has been shown by M. Sostmann, and that hot concentrated syrups dissolve more than weak ones, but prolonged boiling causes a partial separation of the sulphate of lime in the scum.

On glucose in gentian root, by M. Louis Magnes.—The author has examined gentian root carefully by the cupropotassic liquid process of Barreswill, and finds that commercial gentian contains,

when perfectly dried at 212° F., 15 per cent. of glucose, and it before drying retained 17 per cent. of water; so that originally, as taken in commerce, it contained 12 per cent. of glucose.

The author also examined extract of gentian.

Adulterated subnitrate of bismuth.—M. Roussin, in a communication to the Society of Pharmacy of Paris, states that he had found 28 per cent. of phosphate of lime in subnitrate of bismuth. The author tests the subnitrate by dissolving 15 grains in a little nitric, or, better, muriatic acid, and adding tartaric acid. If now an excess of solution of caustic potassa be added, no precipitate will follow if the salt is pure, but if phosphate of lime is present it is precipitated.—*Jour. de Pharm.*

Agave a rubefacient.—The pulp of the leaves constituting the bulk of agave is said to act like mustard, and has been used in veterinary medicine.—*Rep. de Pharm.*

New reagent for nitric acid.—M. Braun suggests the use of sulphate of anilin as a test for the presence of nitric acid. In a watch crystal he puts about a seventh of a grain of sulphuric acid, sp. gr. 1·842, and drop by drop about a fourteenth of a grain of sulphate of anilin, prepared with 10 drops of anilin of commerce, 8 grains of sulphuric acid, and 48 grains of water. Dip a glass rod in the liquid supposed to contain nitric acid, and draw it in the anilin solution; then blow on the surface, when quickly fringes of red, deepening in color with the proportion of nitric acid present, will be seen.

By the aid of this process M. Braun has easily recognized the presence of nitric acid in sulphuric acid, and in drinking waters. —*Jour. de Chimie Méd.*, Avril, 1868.

MEANS OF RENDERING ANIMAL FAT INODOROUS AND WHOLESOME.

According to Prof. Hirzel, animal fats may be preserved in a good condition during a year without their contracting a bad odor, by mixing the recently melted fat, for example, 7 kilogrammes (14½ lbs.), with 20 grams. (5 drachms) of table salt and 15 grains of alum in powder, and heating till a scum is formed on the surface, composed of coagulated albumen, membranes,

&c. The scum is separated, and the fat becomes clear and transparent. When it is cooled it is washed by malaxation many times with water, till the salt is removed. It is then held in a state of fusion, at a temperature sufficient to evaporate all the water, without injuring the fat.—*Bulletin de la Société de Pharm. de Bruxelles.*

ANILIN BLACK USED AS INDELIBLE INK FOR LINEN.

By Dr. Jacobsen.

This ink should be kept in the form of the two following solutions:

I. *Solution of Copper.* Take 8·52 gms. crystallized chloride of copper, 10·65 gms. chlorate of soda, 5·35 chloride of ammonium, and dissolve these in 60 gms. of distilled water.

II. *Solution of Anilin.* Dissolve 20 gms. chlorohydrate of anilin in 30 gms. of distilled water, and add to it 20 gms. of a solution of gum arabic (1 gum to 2 of water) and 10 gms. of glycerin.

On mixing four parts of the anilin solution with one part of the copper solution, a greenish liquid is obtained, which can be used immediately to write on the linen, but it changes after several days. It is necessary, therefore, to keep the solutions separate until wanted. The characters may be traced with a pen, brush or pencil; if the liquid does not flow well in the pen it may be diluted sufficiently without fear of diminishing the intensity of the color, which appears first pale green, and becomes gradually black by exposure to the air. The writing may be rendered black instantly by passing over it a hot iron, or heating moderately the under side over a spirit lamp. It is even better to expose it to a current of steam, which is sufficient to develope instantly the anilin black. After this treatment the tissue is washed with warm soapsuds, when the characters will present a beautiful blue black hue. This ink resists acids and alkalies, and if the ink has penetrated the linen so as to render the characters visible on the reverse, there is no fear that the color will be altered by lye.—*Jour. de Chim. Méd.*, June, 1868.

ON ROSANILIN AS A REAGENT FOR FREE FATTY ACIDS, AND FOR COD-LIVER OIL.

By Dr. F. Jacobsen.

The author finds that rosanilin is insoluble in neutral fatty oils, but is at once colored pale red, more or less deep, if the oil is rancid, or has any free oily acid present, and if very rancid, as deep as gooseberry juice. The fuchsin of commerce (muriate, arseniate, &c., of rosanilin) dissolves in neither neutral or rancid oils, or fat acids. Oleic acid and all the fatty acids dissolve rosanilin immediately in great quantity, and are deeply colored. The oleate of rosanilin dissolves in all proportions in the oils and neutral fats. The rosanilin, for this reason, can be employed to detect free acid in mixtures of oils.

The author proposes this reagent as a means of detecting the so-called bleached cod-liver oil sold in the European markets, which is not cod-liver oil, but the oily fats of different marine mammals, or those oils prepared by shaking with potash lye, and allowed to stand till clarified. As the medical properties of cod-liver oil should be partly attributed to the free fat acids that it contains, the white oil thus prepared possesses properties analogous to the neutral fish oils, and, unless rancid, are not colored by anilin.

In some lubricating oils oleic acid residues have been used as an adulteration, which this test will easily discover.

When an oil contains but very little free acid, the test should be applied as a saturated solution of rosanilin in absolute alcohol,—a few drops added to the oil, and heated in a water-bath with stirring until the alcohol is evaporated. If no free fatty acid is present no coloration is produced, and the test separates, and is deposited at the bottom of the vessel, or remains in suspension as a brownish powder.

Specimens of Provence oil and oil of sweet almonds did not color; oil of poppy seed slightly red; linseed oil deeply red, modified by the yellow color of the oil; castor oil colors yet more decidedly. Olive oil, mixed with five per cent. of oleic acid, is tinted like gooseberry juice.—*Jour. de Chim. Méd.*, from *Neues Jahr. für Pharm.*

ON HYDRARGYRI IODIDUM VIRIDE, B. P.

By C. H. Wood, F.C.S,

The "Green Iodide of Mercury" of the British Pharmacopœia is clearly intended to be identical with the "Iodide of Mercury" of the London Pharmacopœia. This is expressly implied by the "Synonym Hydrargyri Iodidum *Lond.*" given in the description of the preparation in the last edition of the British Pharmacopœia. In both works the chemical compound mercurous iodide is obviously meant, and the British Pharmacopœia defines this by giving the formulæ "Hg_2I or **HgI**." But the London Pharmacopœia, in describing this compound, states, that "when freshly prepared it is *dingy yellow*;" while the British Pharmacopœia names it "Green Iodide," and describes it as "*a dull green* powder." This discrepancy occurring in the description of a definite chemical body is a little remarkable, and requires some explanation. The processes and the proportions of ingredients given in the two Pharmacopœias are almost identical; yet according to one authority we obtain a yellow, and according to the other a green product.

I have frequently made the iodide of mercury according to the London Pharmacopœia, and have always found that it possessed a dull yellow color, certainly with a shade of green upon it, but nevertheless the yellow vastly preponderating. Yet chemical authorities generally indicate that mercurous iodide is a green substance. In Gmelin's 'Chemistry' mercurous iodide is variously described as "a green," "a dark green," and "a yellowish-green;" but no mention is made of its being yellow. The British Pharmacopœias of 1864 and 1867 are therefore in accord with the leading chemical manual.

Being desirous of understanding this matter more perfectly, I made a few experiments to elucidate the point. Upon repeating the process as given in the British Pharmacopœia, I found that the first effect of triturating the mercury and iodine with the spirit was to obtain a red color; due, no doubt, firstly to the solution of the iodine, and secondly to the formation of the red iodide of mercury; but after continuing the trituration for some time the mass became a decided dark green. This then was

the point at which I was to transfer the product to filtering-paper and dry it by exposure in a dark room. But instead of doing this I continued the trituration until the mass was dry. As the rubbing proceeded I found the green color rapidly disappeared, the powder became more and more yellow, and the ultimate result was a yellow substance with a dingy greenish tint upon it. The question that arose, therefore, was to ascertain the composition of the product at the two periods; namely, at the period in which it was decidedly green, and at the subsequent period when it became permanently yellow. To solve this point 200 grains of mercury and 127 grains of iodine were triturated with a little spirit until the dark green color was obtained. A portion of this iodide was then taken for immediate analysis, and the remainder put in a dark place to dry. The analysis was effected as follows:—

A known quantity of the iodide was washed with boiling absolute alcohol, the washings evaporated to dryness, and the residue weighed; it consisted of red or mercuric iodide. The insoluble portion was dried and divided into two parts; one was dissolved in hydrochloric acid and chlorate of potash, the solution evaporated to near dryness, diluted, precipitated with stannous chloride, and the precipitated metallic mercury collected and weighed; the other half of the powder was digested with finely granulated zinc and diluted acetic acid, whereby an amalgam of zinc was formed, the iodine passing into solution as hydriodic acid. After some time the liquid was poured off, nitrate of silver added to it, and the precipitated iodide of silver collected and weighed. Other methods of analysis were also employed, but the above were found sufficiently satisfactory. As some objections might be taken to the use of boiling alcohol, the red iodide was also estimated by washing with ether.

The result of the analysis of the green powder was as follows, the moisture being excluded:—

Mercuric Iodide, HgI_2 . . .	28·6
Mercurous Iodide, HgI . . .	58·4
Metallic Mercury, Hg . . .	13·0
	100·0

It thus became evident that the green product was far from what it should be, according to the formula given by the Pharmacopœia.

I then prepared some of the iodide, continuing the trituration until the green color had passed to the dingy yellow, which, according to the London Pharmacopœia is characteristic of the product. A portion of this compound was then analysed, and the following results obtained:—

Mercuric Iodide, ...	5·0
Mercurous Iodide, ...	92·8
Metallic Mercury, ...	2·2
	100·0

On comparing these numbers with those preceding it will be seen that by continuing the trituration the red iodide had to a great extent disappeared, and so had the free mercury. No doubt these two substances had entered into combination and formed a further portion of the mercurous iodide. The results so far, then, seem to admit of an easy explanation. By the constant trituration the last portions of the metallic mercury reach a state of extremely fine divisions. In this state the metal possesses somewhat of a blue color (well known to us in blue pill, etc.,) which, mixed with the yellow of the mercurous iodide already formed, would produce a green. According to this view, therefore, the green of the iodide is due to a mechanical mixture of mercurous iodide and mercury. It equally follows from this that the true color of pure mercurous iodide must be yellow. This explanation derives additional support from the fact that the green powder cannot be obtained and kept of any uniform tint. As first got it is a decided grass-green, but even while it is drying, however carefully the light be excluded, the color changes, approaching more and more to yellow. At the same time that this change goes on the proportion of mercuric iodide diminishes, and consequently the proportion of metallic mercury must diminish also, thereby lessening the green and augmenting the yellow color.

In Gmelin's 'Handbook' three iodides of mercury are described; namely, the mercurous iodide, the mercuroso-mercuric

iodide, and the mercuric iodide. The first, as I have already mentioned, is stated to be green, dark green, or yellowish-green; the second yellow, and the third red. Three processes are given for the production of mercurous iodide. The first is by direct combination of mercury and iodine. It is the method of the Pharmacopœia which I have examined with the result stated. The second is to decompose calomel with iodide of potassium. In the third process mercurous acetate is substituted for calomel. The second of these methods is stated to yield "pure green" mercurous iodide. As I had entirely failed to obtain such a body by direct combination, I made several careful experiments with this process of double decomposition. 235·5 grs.* of calomel were triturated with 166 grs.* of iodide of potassium previously dissolved in a little water. The mixture was allowed to remain for twenty-four hours and then filtered, the precipitate washed and dried. The product was of a fine dark green color, and entirely different from any iodide I had previously obtained. Upon testing it, however, I found it to contain a large quantity of undecomposed calomel. Its weight was also much less than theory would indicate. By analysis the following numbers were obtained:—

Calomel, ...	41·7
Mercurous Iodide, ...	35·3
Mercury, , ...	23·0
	100·0

Gmelin states that the ingredients must be used in exactly equivalent portions, as any excess of iodide of potassium would separate metallic mercury. This would probably occur in accordance with the equation:—

$$2HgI + KI = \underbrace{HgKI_3}_{\text{Soluble salt.}} + Hg.$$

But although I repeated the experiment several times, weighing the ingredients accurately, and digesting them together for different periods, in no case could I obtain anything like com-

*Equivalent quantities.

plete decomposition. The first portion of mercurous iodide formed was apparently decomposed by the remainder of the iodide of potassium in preference to the residual calomel.

The results of these experiments were consequently confirmatory of those previously obtained, and contributed to show that the green color was really due to a mixture of mercurous iodide and metallic mercury.

I then resorted to the last process given by Gmelin, namely, the reaction of iodide of potassium on mercurous acetate. Equivalent quantities of crystallized mercurous acetate and iodides of potassium were triturated with water. The first effect was the production of a nearly black precipitate, which gradually became green, and, after digesting a day or two, passed to a light yellowish green. The appearance of this precipitate was again different to that of either of the other iodides I had prepared. Upon testing it, I found it to contain a considerable quantity of undecomposed mercurous acetate; consequently free metallic mercury was present in it.

The imperfect decomposition of the calomel and mercurous acetate I thought possibly arose from employing them in the undissolved condition. Of course calomel could not be dissolved, but mercurous acetate is, to a certain extent, soluble. We cannot employ hot water for the purpose without decomposing a portion of the acetate, and converting it into a mercuric salt. I therefore prepared a cold aqueous solution of the mercurous acetate, and tried the effect of mixing it with a very dilute solution of iodide of potassium. Taking care to keep the acetate in slight excess, I succeeded in obtaining a pure yellow precipitate, but, owing to the very slight solubility of mercurous acetate, the quantity of precipitate I obtained was so small that I did not submit it to analysis, and am therefore unable to say whether it was pure mercurous iodide or the mercuroso-mercuric iodide of Gmelin.

This latter compound I have not yet studied in comparison with the yellow mercurous iodide, but I am making a few experiments for that purpose.

It results, then, from what I have stated, that by none of the processes indicated could I succeed in obtaining pure mercurous

iodide, possessed of a green color; that by any of the reactions I could obtain a green product, but that then it always contained free metallic mercury. Moreover, that these green products were never alike in color, but varied from a dull dark green to light yellowish-green.

It also results that to obtain pure mercurous iodide by the process given in the Pharmacopœia, the trituration should be continued until the green mass which forms becomes dry, and assumes a dull yellow color. So obtained, the product is permanent. It still contains small quantities of mercuric iodide and free mercury; the former may, and perhaps ought, to be removed by washing with alcohol or ether.

Lastly, it results that the London Pharmacopœia gives the most accurate description of this compound, although the British Pharmacopœia are best in accord with chemical manuals.—*Lond. Pharm. Journ., May*, 1868.

NOTE ON SYRUP OF HYPOPHOSPHITE OF IRON.

By C. H. Wood, F. C. S.

Since the introduction of the hypophosphites into medicine by Dr. Churchill a few years back, this syrup has been frequently prescribed; and although at the present time it is much less used than the syrup of the phosphate of iron, nevertheless the pharmaceutist is every now and then called upon to supply it. The only process for its production yet published in this country, that I am aware of, occurs among the Notices to Correspondents in the Pharmaceutical Journal, vol. vii. new series, p. 440. We are there directed to dissolve moist and recently-precipitated carbonate of iron in a mixture of hypophosphorous and phosphoric acids, and convert the resulting solution into a syrup. No mention is made of the strength of the hypophosphorous acid, or how the acid is to be obtained.

A very similar method is given in the work on "Practical Pharmacy," by Mr. Parrish. Carbonate of iron is to be precipitated from a given weight of sulphate, and dissolved in a stated quantity of hypophosphorous acid, of sp. gr. 1·036; then sugar added as usual. It will be seen that for both these

processes it is necessary, as a starting point, to have a solution of hypophosphorous acid of some defined and uniform strength. In Parrish's book a formula is given for the production of this acid. It is as follows:—

Take of hypophosphite of lime, 480 grs.; crystallized oxalic acid, 350 grs. or q. s.; water, 9 fl. oz. Dissolve the hypophosphite in 6 oz. of the water, and the acid in the remainder with the aid of heat; mix the solutions, pour the mixture on a white paper filter, and when the liquid has passed, add distilled water carefully, till it measures 10 fl. oz., and evaporates this to 8½ fl. oz. The solution thus prepared is stated to contain about 10 per cent. of real acid (HPH_2O_2).

Having frequent occasion to prepare this hypophosphite of iron, I at first resorted to the process given by Mr. Parrish, and made a quantity of the hypophosphorous acid by his method as just described. But upon carefully testing the acid I obtained, I found it was not so pure as theory would indicate it should be; in fact, it contained an appreciable quantity both of oxalic acid and of lime. The free hypophosphorous acid had dissolved a portion of the oxalate of lime. This impurity seemed to me to be of some importance, and, as it could not be got rid of, it constituted an objection to the process. It was easy to produce a purer acid by resorting to hypophosphite of baryta, and exactly decomposing its solution with sulphuric acid. But as the syrup of hypophosphite of iron is only occasionally demanded, and as, from its proneness to oxidation, it deteriorates greatly by long keeping, it appeared desirable to possess a more expeditious method for its preparation than that which involves the elimination of the acid, and precipitation of the iron as carbonate. I consequently abandoned the use of the acid, and resorted to a process of double decomposition.

When hypophosphite of lime and sulphate of iron are brought into contact, sulphate of lime is precipitated, and ferrous hypophosphite remains in solution.

$$Ca(PH_2O_2)_2 + FeSO_4 = Fe(PH_2O_2)_2 + CaSO_4.$$

Using these materials in their atomic proportions, the iron salt is obtained contaminated only by a small quantity of sulphate of lime, and the amount of the latter may be reduced to a minimum by employing very little water as a solvent.

It became necessary, however, for the trustworthiness of this method, to ascertain whether commercial hypophosphite of lime is sufficently pure and definite to effect always an exact decomposition of the sulphate of iron. I therefore analyzed several samples of the salts, and found that the amount of real hypophosphite ($Ca(PH_2O_2)_2$) varied from 92 to 94 per cent., the remainder consisting chiefly of water, with a little carbonate and phosphate of lime.

This variation in composition I regard as too slight to be of any material importance. In calculating the quantity of salts necessary for the reaction, the lime salt may be regarded as containing 90 per cent. of real calcic hypophosphite, a slight excess of the latter being preferrable to any surplus of the sulphate of iron. The proportions to be then employed for 320 grs. of ferrous hypophosphite, $Fe(PH_2O_2)_2$ are 480 grs. of crystallized sulphate of iron and 326 grs. of commercial hypophosphite of lime. If the two salts are triturated with $2\frac{1}{2}$ oz. of water, the resulting paste pressed out, and the filtered liquid mixed with seven times its volume of simple syrup, the product contains 2 grs. of hypophosphite of iron in each fluid drachm.

But the syrup so produced does not keep long unless atmospheric air is thoroughly excluded. After a few hours' exposure, a precipitate begins to form at the surface, and gradually passes downwards. To prevent this, it is necessary to introduce a free acid, and phosphoric or citric acid is best suited for the purpose. The former is preferrable, because it is more in chemical accordance with the other constituents of the syrup. I have tried the use of free hypophosphorous acid, but it does not answer well, being a very bad solvent for the insoluble ferric hypophosphite which forms after a time in the syrup. The process I follow, therefore, stands as follows:—

Granulated Sulphate of Iron . . .	480 grs.
Hypophosphite of Lime	326 grs.
Dilute Phosphoric Acid	1 fl. oz.
Water	$1\frac{1}{2}$ oz.
Syrup	q. s.

Dissolve, without heat, the sulphate of iron in the phosphoric

acid, previously mixed with water. Rub the hypophosphite to fine powder, and pour on it the solution of the sulphate of iron. Triturate together for two or three minutes, then pour the mixture on to a piece of damped calico, and squeeze out the liquid as far as possible with the hands. Filter the solution so obtained into a measure-glass, and add to it seven times its volume of strong syrup. The resulting syrup contains 2 grs. of hypophosphite of iron, $Fe(PH_2O_2)_2$ in each fluid-drachm. The time occupied in its preparation need not exceed a quarter of an hour. As hypophosphite of lime is now in general use, the materials are always at hand, and the syrup may therefore be prepared at the time it is wanted, its goodness and uniformity being thereby ensured. It is true that the syrup so obtained is contaminated with minute quantities of lime and sulphuric acid. But it must be borne in mind that the amount of sulphate of lime held in solution by 2½ oz. of liquid is so small that its proportion in the syrup must be very minute.

It is very probable that this process for preparing the syrup has been resorted to by other operators, but as no description of it has been published, it seemed desirable to give it insertion in the Pharmaceutical Journal. It is obvious that the same method is applicable to the production of the syrup of hypophosphite of iron and quinine,—sulphate of quinine being decomposed by hypophosphite of lime in the presence of a free acid.—*Lond. Pharm. Journ., April*, 1868.

NITROGLUCOSE.

By M. Carey Lea.

As nitroglucose has been much less studied than its congeneric nitro-substitution compounds pyroxyline, xylodine and nitroglycerine, a few words on its preparation and properties may not be uninteresting.

The substitution does not take place in sugar with quite the same facility as cellulose; the acids need to be stronger and the temperature lower. The sugar, moreover, appears at first to dissolve, and then to separate out again, in the form of a greyish paste, which when thrown into water and freed from the adhering acid, becomes nearly white.

An attempt to prepare nitroglucose by the use of nitre and sulphuric acid, which succeeds so well and so easily in the case of cellulose, failed almost wholly with sugar. Not more than two or three per cent. of the weight of the sugar was obtained.

With sulphuric and strong nitric acids, allowed to cool thoroughly after mixing, the reaction takes place easily, and a considerable quantity of nitroglucose is obtained. The nitric acid should be as strong as possible, and as the acid of the requisite strength is not easily obtained commercially, I have found an advantage in using in part the fuming sulphuric acid. Two fluidounces of fuming sulphuric acid, two of common sulphuric, two of strong nitric acid, as near to 1·5 sp. gr. as can be obtained, give good results. The sugar is stirred in, in the form of powder, to a thin paste. The stirring is kept up, and as fast as the nitroglucose separates in doughy masses, it is removed with a spatula and thrown into cold water. A further addition of sugar will give more nitroglucose, but considerably less in proportion than the first edition. As soon as possible, the nitroglucose is to be kneaded up with cold water, to get the acid out. In one case when this was neglected, for ten or fifteen minutes, the nitroglucose passed to a greenish color and apparently was undergoing a commencing decomposition.

The removal of the adhering acid is much more difficult than in the case of pyroxylin, and is an extremely disagreeable operation. The acid pervades the whole of the doughy mass so fully that the fingers are stained and burned by it, nor can the whole of the acid be removed satisfactorily in this way. The best means I found was to dissolve the crude nitroglucose in a mixture of alcohol and ether and then to pour this into a large quantity of cold water with constant stirring, and violent agitation afterward. The method is not altogether satisfactory, and seems to be attended with some loss of material, though why, it is not easy to see.

Prepared in this way, nitroglucose is a white lustrous body, which may either assume the doughy amorphous condition or the crystalline, and passes from one to the other with extreme ease. When first formed by the mixed acids, it always has the doughy form. That which I obtained by the use of nitric and

sulphuric acid, was crystalline from the first. When precipitated by water from its solution in alcohol and ether, it is doughy and almost liquid, and remains so for a long time, if there is any considerable quantity of it.

The best mode of preserving it appears to be under water. By standing thus it gradually hardens, and passes sometimes to a somewhat hard amorphous mass, and sometimes to a granular crystalline state. It appears to be wholly insoluble in water. A few minute grains of the crystalline form diffused through 15 or 20 ounces of water, did not dissolve after many hours standing. In a mixture of alcohol and ether it dissolves as easily as sugar in water, and in such quantity as to make the liquid syrupy.

Its detonating properties are but slight. If it be well dried and a match applied, it deflagrates with a feeble flash.

It has been stated by Dr V. Monckhover, that when dissolved in alcohol and kept sometime in a warm place, it undergoes decomposition, as evidenced by the fact that the solution then gives an abundant precipitate with nitrate of silver, which at first it did not do. An experiment made in this direction did not give the result thus indicated. A solution of nitroglucose in alcohol, containing about 40 grains to the ounce, was placed in a stoppered vial and was kept in the sand bath at a temperature of about blood heat for nearly a month. But neither it nor a fresh solution gave a precipitate with alcoholic solution of nitrate of silver. It would seem from this that certain conditions of temperature or otherwise are necessary, in order that this decomposition should take place.—*Am. Journ. of Science and Arts, May*, 1868.

CHALK-EATING.

By W. W. Ely.

Mr. Editor.—A gentleman who has been an occasional patient of mine for twenty-five years past, began the use of chalk in 1842. I have made notes of the case, when I have had occasion to see him, since April, 1844. For some time previous to using the chalk he was pale and sallow, and was affected with

diarrhœa, which followed an attack of fever. His weight was then 135 pounds. During the first year he took fifty pounds of prepared chalk, regained his health, and reached a weight of 180 pounds, The chalk was then omitted for a year or more, as his desire for it ceased. The year previous to May, 1846, he used about three-fourths of a pound per week. In November, 1850, he reported a constant use of one pound per week, except for a short time when he was unable to procure it. His health continued good, and his weight was undiminished. Its use was then suspended for a year previous to July, 1852. From this date to the present time—February 1868—a period of fifteen years and a half, he has continued to take it at the full rate, one pound per week. The total amount used, as nearly as it can be estimated, is 1050 pounds—half a ton of chalk in about twenty-five years! The chalk has been taken simply to satisfy a craving for it, and to relieve gastric irritation, which yields immediately to its ingestion. During the first half of the period, his health was not sensibly impaired by the use of chalk; latterly, however, he has been an invalid, and has led an inactive life; but how much of his debility and suffering have been due to the habit in question is not easy to determine. His bowels have been generally regular. His appetite and digestion are somewhat impaired, and his appearance is decidedly valetudinary. His age is 67 years, and his present weight is 145 pounds, being less than for two years past.

In January, 1867, I noticed a general discoloration or "bronzing" of the skin. His urine, being examined at the time, was of natural color, slightly alkaline, and free from albumen. The dark color of the skin is now somewhat intensified, resembling a mulatto. There is some irregularity in the action of the heart, with a strong mitral regurgitant murmur. He uses tobacco, and stimulants in moderation, and for three years past has taken morphine not exceeding one grain daily. From the time of my first acquaintance with this patient to his commencing the use of chalk, he was subject to functional derangements of the stomach, which, during the next ten years, were relieved by the comparatively moderate use of his favorite article. During the later years, it is not improbable that the chalk has operated

injuriously as an indigestible substance. I have reported the case, with its principal features, as a sort of medical anomaly, rather than with the belief that it possesses any practical importance.

Rochester, N. Y., Feb., 1868.

—*Bost. Med. and Surg. Journ., March*, 1868.

RHIGOLENE AS A LOCAL ANÆSTHETIC.

By John D. Jackson, M.D., of Danville, Ky.

A brief record of a few observations I have made upon rhigolene, may perhaps not be deemed amiss as supplemental to the paper on Local Anæsthesia, by Dr. Weist, which appeared in the January number of the *Western Journal.*

The statement that direct sunlight has produced an explosion of rhigolene, has, I know, deterred a large number of the profession from using what from the statement would be supposed to be a dangerous article—especially while ether, which is not deemed to have such a property, can be found to fill its place.

To test this, in September last I exposed on a metallic roof, to the full rays of the sun, the thermometer at 120 F., a phial containing an ounce of rhigolene, of the brand of Theo. Metcalfe & Co., Boston. Within a minute, the cork was blown four or five feet into the air, and rhigolene underwent violent ebullition, which, however, subsided within a few seconds. The cork was replaced, and pressed in more tightly, when some minutes elapsed before it was again expelled, and with more violence than before. This was repeated many times, the exposure to the direct rays of the sun being continued for a quarter of an hour.

To further test its explosive properties, I filled two drachm phials, such as are found in ordinary medicine pocket cases—one with rhigolene of the brand above mentioned, and the other with Squibbs' Æther Fortior, and applied a lighted match to each. The ether burned, yielding the customary bluish flame, and went out at the end of 32 minutes, a little more than a fourth of the contents of the phial having been consumed. The rhigolene burned with a more brilliant light, yielding a yellowish blue flame,

which expired at the end of 63 minutes, exhausting nearly half the contents of the phial.

These experiments were several times repeated, and always with the same results. In our experiments the rhigolene phial, while aflame, was accidentally upset, and the contents poured out upon the table, burning with a beautiful flame, and was rapidly consumed, leaving the table (walnut) nearly unscorched.

These observations show, I think, that the rhigolene is certainly not explosive in the sense that gunpowder and nitro-glycerine are, and that while more volatile and inflammable than ether, that the dangers to be apprehended while using it, are precisely those attending the use of the latter.

A bottle stoppered tightly with glass, exposed in a room at a temperature above 70 F., may have the stopper to dance, from the volatilization of some of the rhigolene, and so in the use of the Richardson's instrument, the cork is sometimes blown out for the same reason. The hand directly in contact with a bottle containing ether or rhigolene, produced a temperature sufficient to volatilize either—the ether (+ 96° F.,) or rhigolene (+ 70° F.) For preventing this, we know of no better method than that adopted by Dr. Krackowizer—the enclosing of the bottle within a double-walled wire gauze box, the space between the inner wall and bottle being filled with wet sponge, the evaporation from which always keeps the contents of the bottle below boiling point.

Dr. Bigelow has depressed the mercury with rhigolene to —19° and Page to —16°, while Dr. Krackowizer could never get a lower temperature than —8°. Our experience more readly corresponds with the last experimenters, being able, with Tiemann's modification of Richardson's apparatus, to depress the mercury to —10°.— *Western Journ. of Medicine, April*, 1868.

ON A FALSE CINCHONA BARK OF INDIA.

By J. Broughton, B.SC., F.C.S.,
Chemist to the Government Cinchona Plantations of the Madras Presidency.

Among the numerous indigenous febrifuges of South India, one of the most interesting is the bark of the *Hymenodictyon*

excelsum (Wallich), or pundaroo. The considerable interest which attaches to this plant does not depend so much on its proved efficacy in medicine as upon its history and botanical relations. Belonging to the same Order as the true Cinchonas, it so greatly resembles them in appearance that for many years it was known by the name of *Cinchona excelsa*, a name which was, I believe, first bestowed upon it by Pennant. Being thus considered the only cinchona indigenous to India, great expectations were entertained that it would be found at least a most valuable febrifuge, if not an actual source of quinine. This opinion was, to some extent, corroborated by the bitter taste of the bark, and by its being used as a febrifuge among the natives. Roxburgh* states that the inner coats of the bark possess both the bitterness and astringency of Peruvian bark and, when fresh, in a stronger degree. The bitter taste, however, on chewing, is not easily perceived, but is more lasting. Ainslie, speaking of the various substitutes that had been recommended for Peruvian bark, mentions the bark of *Cinchona excelsa* as having been ascertained to possess powerful tonic and antifebrile virtues.

O'Shaughnessy speaks of the bark as follows:†—"The two inner leaves of the bark possess great bitterness and astringency; the bark is used by tanners, and also as a medicine by the Hindoos in cases requiring astringents."

"We have analysed the bark of *Cinchona excelsa* from the Botanic Gardens of Calcutta, but could detect no alkaline ingredient; nevertheless the trees of hilly regions may furnish the valuable desideratum. The stamens being contained within the tube affords much ground for expecting this discovery of a febrifuge alkaline in this species."‡

The plant to whose bark the above mentioned virtues are ascribed is a fine timber tree. Its handsome foliage might easily be mistaken by an observer not acutely botanical for that of *Cinchona Peruviana*. Its bark is thick with a liber of loose

* Flora Indica, vol. ii. p. 149.

† Bengal Dispensatory, 1842, pp. 394, 395.

‡ Analyses of the bark of the *Hembra* varieties of the cinchona of the Government plantations have not hitherto corroborated the hypothesis alluded to by O'Shaughnessy.

texture, but abundant in large, woody cells, which are thickened and hardened by ligneous deposit, so that they produce an almost gritty sensation when placed between the teeth. The bark possesses the remarkable property of being very bitter when quite fresh, but this bitterness diminishes on keeping, so that after a few days it has so decreased that the bark becomes nearly tasteless.

The foregoing circumstances induced me to submit the bark to a careful chemical examination, in the hope that I might be fortunate enough to discover a proximate principle, whose constitution might, perhaps, throw some light on that of the true cinchona alkaloids.

By the kindness of Major Morgan, Deputy-Conservator of Forests, I obtained a supply of the fresh bark from the neighborhood of Mudumullay. From it I was finally successful in obtaining the bitter principle in a pure crystalline state. After many trials, I found the following simple process enabled me to obtain it in considerable quantities:—The sliced fresh bark is boiled with water till it becomes somewhat soft, when it is drained and squeezed through a cloth. The bitter decoction thus obtained is carefully evaporated to a small bulk over an open fire, when it is mixed with a sufficient quantity of calcined magnesia to render it of a creamy consistency, after which it is evaporated to dryness by a steam heat. The residue is then powdered, placed in a flask, and repeatedly exhausted with strong alcohol, and filtered. The alcoholic extract thus produced is magnificently fluorescent, surpassing in this respect a solution of sulphate of quinine. The alcohol is then nearly removed by distillation, and the liquid residue is set aside in a cool place for twelve hours, when the whole solidifies into a mass of fine white prismatic crystals, which can be obtained quite pure by two further crystllizations from water.

The crystals are somewhat sparingly soluble in cold water and alcohol, but readily dissolves in those liquids when boiling. The solutions are beautifully fluorescent, but they loose this property by the addition of a drop of hydrochloric acid. When boiled with the latter reagent, and the solution subsequently poured into a hot alkaline solution of cupric salt, a precipitate of red

cuprous oxide was immediately produced. An aqueous solution of the crystals only precipitated the cupric solution on prolonged boiling. The substance therefrom appeared to be a conjugate compound of grape sugar.

The purified crystals were dried in vacuo over sulphuric acid for several days. They were then submitted to analysis, and then yielded the following numbers:—

I. 0·4793 grm. burnt with cupric oxide yielded 0·9147 grm. carbonic acid and 0·2209 grm. of water.

II. 0·4176 grm. yielded 0·7937 grm. carbonic acid and 0·1995 grm. water.

I found on comparison that the foregoing numbers closely correspond with those yielded by æsculin, the fluorescent and crystalline principle of horse-chestnut bark discovered by Fleischmann, and subsequently analysed by Tromsdorff in 1835.* This is clearly shown by the following comparison:—

	Æsculin.		I.	II.
C_{21}	252	52·06	52·04	51·90
K_{24}	24	4·96	5·12	5·31
O_{13}	208	42·98	42·84	42·79
	414	100·00	100·00	100·00

Rochleder and Schwars† found that on boiling æsculin with hydrochloric acid it split up into æsculetin and grape sugar.

$$C_{21}H_{24}O_{13}+3H_2O=C_9H_6O_4+2C_6H_{12}O_6.$$

When the crystalline substance obtained as above is boiled with hydrochloric acid for a few minutes, and allowed to cool, needle-like crystals, having all the appearance of æsculetin, separate. When these latter are boiled with a solution of ferric chloride a fine green coloration and precipitate are produced; this reaction is characteristic of æsculetin. I consider it therefore proved that the crystalline substance obtained from *Hymenodictyon excelsum* is identical with æsculetin.

It is a somewhat singular circumstance that the bitter principle of this Indian tree should be the same as that of the horse-

* Annalen d. Chemie und Pharmacie, Bd. xiv. 198.

† *Ibid.* lxxxvii. 186.

chestnut. The complete identity in the behaviour of the two substances leaves, however, no room for doubt. It is also remarkable that horse-chestnut bark has obtained a reputation on the continent of Europe, being like the *Hymenodictyon* in India, a good substitute for cinchona bark. Lindley and other authors mention that it has been recommended as a valuable febrifuge in intermittents.

The occurrence of the same principle in genera so widely separated (botanically) as *Hymenodictyon* and *Æsculus* will recall to mind the more famous but parallel instance of the common constituent of tea and coffee. But in the former case there is a further interesting link of connection. In an exhaustive chemical examination made by Rochleder of the cotyledons and bark of the horse-chestnut, he found as a constituent of the former a substance isomeric with quinovine, the bitter constituent of cinchona leaves, and also occurring in the bark. The full significance of these coincidences will doubtless one day be made apparent.

The fluorescence of a slightly alkaline solution of the æsculetin obtained as above is the most beautiful instance of that phenomenon that has ever come under my notice. It is finely seen when the solution is illuminated by the light of sulphur burning in oxygen.

The cause of the loss of bitterness which the hymenodictyon bark suffers by keeping is more readily explained. Æsculin, by contact with changing organic substancs, becomes slowly converted into æsculetin, and glucose by the same decomposition that can be more immediately produced by boiling with acids. When a solution of æsculin is mixed with emulsion of sweet almonds, the change takes place in about two days. The soluble bitter substance of the fresh bark gradually changes into the sparingly soluble æsculetin, which has comparatively little taste, the bark becoming less bitter from day to day. That this is really the case can be experimentally shown by boiling a few fragments of *stale* bark in a test-tube with some water; on cooling, an abundance of glittering crystals will be deposited, which can readily be recognized by their form and their behavior towards polarized light. They form beautiful microscopic

objects. Perfectly fresh bark yields no æsculetin when thus treated.

The bark of *Hymenodictyon excelsum* differs entirely in its chemical characters and products from cinchona bark. Containing no trace of quinine, the expectations once entertained of its medical value appear to have but little support in fact.—*Lond. Pharm. Jour., March,* 1868.

GRAPHITE IN CALIFORNIA.

The principal plumbago deposit of California, known as the Eureka Black Lead Mine, is situated on the west side of Tennessee Gulch, a tributary of Wood's Creek, about 1½ miles from Senora, the country seat of Tuolmune county, and about 68 miles from Stockton, the head of navigation on the San Joaquin River. The mineral exists as a well defined lode, from 20 to 30 ft. wide, having a dioritic foot-wall on the west, and a soft clay-slate hanging wall on the east. The trend of this lode is nearly north-east by south-west, and it dips very irregularly to the east, at some places being nearly vertical, and at others nearly horizontal. It has been traced and explored for 3,900 ft., beyond which there are but faint indications of its existence. The whole deposit, including the walls and vein, is enclosed in the limestones peculiar to Tuolmune and the adjoining counties. The graphite near the surface is much contaminated with the materials of the clay-state, which rapidly decomposes on exposure to the atmosphere. It was this circumstance that delayed the development of the mine, as it was found impossible to separate the earthy matter from the more valuable plumbago. About two years since it was discovered that the graphite floated on water, when a simple apparatus was employed, which separates nearly 100 tons per day, giving employment to some 25 laborers to wheel the stuff from the mine to the arrastre, about 50 ft. distant. This separating process is not now required, for a large portion of the vein below the surface, at a depth of 40 ft., the graphite is cut out in solid blocks, and sacked without any further preparation; but it is divided by lenticular bodies of clay-slate, a few inches thick, and some-

times extended for several feet. This material is heavily charged with graphite, and is washed in order to separate it. At the depth of 60 ft. the graphite is exceedingly solid and hard, with a very fine lustre. The whole material is taken out between the walls by an open cutting; all found not absolutely pure is washed, the other is bagged at once.

The product of the mine at present is about 1,000 tons per month, but is capable of an almost indefinite extension. The process of separating the graphite from the impurities is very simple. An inexpensive sort of large vat, with a stone bottom, 20 ft. in diameter, and 3 ft. deep, holds the materials, which are stirred up by iron rakes, fastened to four cross-bars projecting from an upright shaft, moved by a water-wheel. When in motion a small stream of water passes into this vat, an outlet to which exists a few inches from the surface; through this outlet the graphite passes with the water, and is led by spouts into broad tanks, where it temporarily subsides, when the dirty water is run off, and a large stream of clean water forces the graphite into a series of shallow tanks, in which it is dried by the sun, the whole process requiring about five days to complete. The tanks and reservoirs at present used cover several acres. The cost of production of the solid plumbago at the mine does not exceed 4s. per ton, two men in the lower workings being able to extract 10 tons per day of solid graphite, in blocks of any desired size. The water used on the mine costs but £10 per month, which sum is more than realized by gold found in the vat when cleaning up, there being a thin seam of auriferous quartz between the hanging wall and the graphite occasionally passing into it. Lumps of gold, worth 8s to £4 each, are sometimes found imbedded in the graphite.—*Chemical News, May* 1, 1868, *from Dicker's Mining Record.*

ABSINTHE.

The indulgence in absinthe, which already prevails to a great extent among all classes of Frenchmen, threatens to become as wide-spread in France and as injurious there as opium eating in China. If a visitor to Paris strolls along the boulevards from

the Madeleine to the Bastile some summer's afternoon, between five and six o'clock—which is commonly called "the hour of absinthe"—he can hardly fail to remark hundreds of Parisians seated outside the various cafés or lounging at the counters of the wine shops and imbibing this insidious stimulant. At particular cafés—the Café de Bade for example—out of fifty idlers seated at the little round tables, forty-five will be found thus engaged. But it is not on the boulevards alone that absinthe is the special five o'clock beverage. In most of the wine shops in the faubourgs, in the "Quartier Latin," and round about the Ecole Militaire, you may see at that particular hour workmen, students, soldiers, clerks, charbonniers, chiffonniers, even, mixing their customary draughts of emerald-tinted poison, and watching the fantastic movements of the fluid as it sinks to the bottom of the glass; wherein it turns from green to an almost milky white, at the moment when the perfumes of the various aromatic plants from which it is distilled disengage themselves.

A quarter of a century ago absinthe was the drink of French coachmen, grooms and footmen, and people of the lowest class; to-day its most ardent lovers are to be found among educated and well-to-do Parisians. Literary men, professors, artists, actors, musicians, financiers, speculators, shopkeepers, even women, yield themselves up to its seductive influence—to those undefinable provocations which seem, they say, to impart renewed activity to an enfeebled brain, developing a world of new ideas, and which thus, it is believed, have inspired many a noble work of imagination in literature and art. It may be so; but then those who habitually excite the brain with absinthe soon discover that they can produce positively nothing without its aid, and that a time arrives when heavy stupor supercedes that excitement of the intellectual faculties which once seemed so easy and so harmless.

After the first draught of this poison, which Dr. Legrand, who has studied its effects, pronounces to be one of the greatest scourges of our time, you seem to lose your feet, and you mount to a boundless realm without horizon. You probably imagine that you are going in the direction of the infinite, whereas you are simply drifting into the incoherent. Absinthe affects the brain unlike any other stimulant; it produces neither the heavy drunk-

enness of beer, the furious inebriation of brandy, nor the exhilarant intoxication of wine. It is an ignoble poison, destroying life not until it has more or less brutalized its votaries, and made drivelling idiots of them.

There are two classes of absinthe drinkers. The one, after becoming accustomed to it for a short time, takes to imbibing it in considerable quantities, when all of a sudden delirium declares itself. The other is more regular, and at the same time more moderate in its libations; but upon them the effects, though necessarily more gradual, are none the less sure. Absinthe drinkers of the former class are usually noisy and aggressive during the period of intoxication, which, moreover, lasts much longer than drunkenness produced by spirits or wine, and is followed by extreme depression and a sensation of fatigue which is not to be got rid of. After a while the digestive organs become deranged, the appetite continues to diminish until it is altogether lost, and an intense thirst supplies its place. Now ensues a constant feeling of uneasiness, a painful anxiety, accompanied by sensations of giddiness and tinglings in the ears; and as the day declines, hallucinations of sight and hearing begin. A desire of seclusion from friends and acquaintances takes possession of the sufferer, on whose countenance strong marks of disquietude may be seen; his mind is oppressed by a settled melancholy, and his brain effected by a sort of sluggishness which indicates approaching idiocy. During its more active moments he is continually seeing either some imaginary persecutor from whom he is anxious to escape, or the fancied denunciator of some crime he dreams he has committed. From these phantoms he flies to hide himself, or advances passionately towards them protesting his innocence. At this stage the result is certain, and dissolution is rarely delayed very long.

The symptom that first causes disquiet to the habitual absinthe drinker is a peculiar affection of the muscles, commencing with fitful contractions of the lips and muscles of the face and tremblings in the arms, hands, and legs. These are presently accompanied by tinglings, numbness, and a distinct loss of physical power; the hair falls off, the countenance becomes wan and sad-looking, the body thin, the skin wrinkled and of a

yellowish tinge—everything, in short, indicates marked decline. Simultaneously with all this, lesion of the brain takes place; sleep becomes more and more disturbed by dreams, nightmares, and sudden wakings; ordinary illusions, succeeded by giddiness and headaches, eventually give place to painful hallucinations, to delirium in its most depressing form, hypochondria, and marked impediment of speech. In the end come entire loss of intellect, general paralysis, and death.

There are two kinds of absinthe consumed in Paris, the common and the Swiss absinthe, the latter of which possesses almost double the intoxicating properties of the former. A few years ago the consumption of the common absinthe was three times that of the Swiss; but now the proportions are reversed, and four times as much Swiss absinthe is drunk as of the common quality. According to official statistics, France receives from Switzerland nearly 2,000,000 gallons of the noxious compound annually; in addition to which an enormous quantity made in Paris is sold as the veritable Swiss production.

Genuine absinthe is distilled from the leaves of major and minor absinthe, angelica roots, calamus aromaticus, aniseed, dittany leaves, and wild marjoram, all of which have been previously bruised and soaked for a period of eight days in alcohol. A quantity of oil of aniseed is then added, and the whole is carefully mixed together. Occasionally fennel, mint, etc., enter into the composition. The utmost care is taken to obtain the right shade of color, and to ensure the liquid expanding and whitening well when mixed with water. Should it prove to be deficient in these qualities the manufacturer does not hesitate to add indigo, hyssop, nettles, and even to have recourse to sulphate of copper to obtain the precise tint of green, or chloride of antimony to produce the milky white precipitate, both of these chemicals being deadly poisons.

Paris actually has its clubs of absinthe drinkers, the members of which are pledged to intoxicate themselves with no other stimulant, and even to drink no other fluid—the only pledges, it is believed, which they do not violate.

They assemble daily at some appointed place of rendezvous at a certain hour, and proceed to dissipate their energies and

their centimes in draughts of that fatal poison which fills the public and private madhouses of Paris. These absinthe-drinking clubs are certainly not numerous, but liquor shops abound in all quarters of the city were absinthe may be said to be the stable drink; and lately several have sprung up which, to attract the youth of Paris to them, dispense the insidious beverage at the hands of pretty women.

In the French army drinking absinthe of the cheapest quality, and as a matter of course the most deleterious of all, used to prevail to such an extent that both military and medical commissions were appointed to report upon the practice and the effects resulting from it. The facts that came to light were so alarming that the Government not only formally interdicted its consumption, but made every endeavor to keep it beyond the reach of the soldiers. In Paris and other garrison towns these efforts were not particularly successful; but it fared hard with any camp followers of expeditionary corps in Algeria, or at Chalons or other parts of France where temporary camps were formed, who chanced to be detected in supplying absinthe to the troops. In the French navy its consumption is rigidly prohibited, not merely to the common seamen, but to the officers as well.—*Chemist and Druggist, May* 15, 1868, *from Pall Mall Gaz.*

VEGETABLE PARCHMENT PRESERVE COVERINGS.

Messrs. Thomas De la Rue & Co. are now supplying vegetable parchment, cut into suitable sizes for jar-coverings, in small packets, and as this cheap and efficient substitute for animal membrane is rapidly coming into general use we advise our readers to add these preserve coverings to their sundry wares. The vegetable parchment is in many respects superior to bladder for excluding air and moisture from preserves, and is much cheaper than the commonest description of skin. It is inodorous, and is not liable to promote fermentation, as, unlike animal membrane, it contains no nitrogen; it is less subject to the attacks of insects or mice, and is more elegant in appearance than bladder. Its use is attended with little trouble, for when the material has been wetted by immersion in water it is soft

and yielding and can be readily stretched and tied over the jar. As evidence of its fitness for covering preserves we need simply mention that since the year 1859 nearly six millions pots have been covered with it by one firm alone. Vegetable parchment is merely unsized paper in which a remarkable physical alteration has been induced by the action of diluted sulphuric acid. Its formation appears to have been first noticed in 1847 by Poumarède and Figuier, who gave to the altered paper the name of *papyrin*. The discovery remained, however, without practical application until the year 1857, when it was patented in this country by Mr. W. E. Gaine, a gentleman whose attention had for many years been directed to the improvement of paper used for photographic and other technical purposes. The material was named by Mr. Gaine *vegetable parchment* or *parchment paper*, and is now manufactured on a large scale by Messrs. De la Rue & Co. To insure the conversion of the soft unsized paper—which is familiarly known as blotting-paper, and technically as *water-leaf*—into a tough material resembling animal parchment, many precautions are requisite. The sulphuric acid by which this strange conversion is effected must be of a certain strength, for if it be too weak the paper is dissolved, and if too strong it is charred. The proper degree of dilution is attained by mixing ordinary sulphuric acid of sp. gr. 1·845 with half its bulk of water. On passing the blotting-paper or water-leaf into this diluted acid, it is converted in a few seconds into a gelatinous gummy sheet. This, on being passed into water, in order to remove the adhering acid, becomes within a minute, a tough, elastic, skin-like substance, which, when thoroughly freed from acid, is the vegetable parchment of commerce. Freedom from acid is insured by repeated washings in water, and by immersion in a weak solution of ammonia, which converts any slight trace of acid that may remain into ammonic sulphate. The most curious fact connected with the formation of the vegetable parchment is that the chemical composition of the paper and of the sulphuric acid remains unchanged. The paper gains nothing and loses nothing, and if submitted to chemical analysis after conversion into parchment, it is found to have the exact composition that it had originally. The change is therefore

purely a physical one, and must be ascribed to a rearrangement of the molecules of matter of which the paper is composed. The practical difficulties connected with the manufacture of this material on a large scale have been very great, but they have been successfully overcome by Messrs. De la Rue & Co. Mr. Gaine's original patent expired last year, but in consideration of the great merit of the invention and the expenses incurred in working it, the Judicial Committee of the Privy Council advised that the patent should be prolonged for five years dating from December last.—*Chemist and Druggist, May* 15, 1868.

NOTES ON THE CULTURE AND COMMERCE IN OPIUM IN ASIA MINOR.

By E. R. Heffter, of Smyrna.

The difficulties that surround agriculturists in this country are great and numerous, arising principally from the scarcity of laborers, want of capital, roads, etc., and so heavily do they press, that, were it not for the advantage of a fine soil, and climate, very little cultivation indeed could exist. The agricultural implements are of the most primitive description, and an idea of them can be formed by the fact that the plough does not go deeper into the soil than say four inches; another proof of the superiority of both climate and soil is, that all the crops are produced without irrigation. In the case, however, of the Opium grower, there are other difficulties besides entirely beyond his control, viz., the very sensitive nature of the poppy plant and particularly perilous condition of the crop when about being collected, which render its cultivation by far the most hazardous.

The poppy, unlike other plants, is generally sown at three different times in one season. For instance, the grower who intends sowing three acres of land, will do so one at a time, and will begin with the one acre about the middle of November or so, after the first winter rains; a second acre he will sow in December, and a third or last between February and March. The first sowing is called *Giuzmaly*, the second *Kishmaly*, and the third *Yazmaly*. Two are the reasons for this practice, both of which are of paramount importance. First, by this arrangement

the chance of a total failure of the crops is obviated, and secondly, as it makes a difference of about a fortnight between the time the first and last sowings arrive at maturity, it economizes laborers, as in fact there would not be sufficient hands to gather half the quantity, if this system were not in a great measure pursued; as it is, when the crops succeed well, fully one-fourth of them is lost for want of hands.

A moist soil is indispensable to the success of the plant; too much moisture, on the other hand, is injurious; it therefore follows that with a wet winter it grows best on hilly grounds, and with a dry winter in low plains.

Owing to the difference of climate between the upper and lower country, in the former, which is the coldest, the first crops are gathered in July, and in the latter in May; just about the time the plant is maturing, should it happen to shower, a very great increase of the crop is obtained.

The calyx of the poppy, better known under the name of poppy-head, is that part of the plant whence the Opium is extracted. It is considered to have arrived at maturity when it has changed to a lighter green hue, and the extraction is then effected in the following manner:

An incision is made with a knife across the poppy-head, half round, horizontally, and some times horizontally and vertically too; this is generally done in an afternoon, and by the next morning it is found to be covered with milk, or juice, that during the night has oozed from it, which the gatherer scrapes with his knife, transferring it from the latter to a leaf of the poppy he holds in his left hand. At every alternate scraping the knife is wetted with saliva by drawing it through the mouth to prevent the juice from adhering to it.

Great precision is required in making the incision. Should it be too deep, and the interior coating containing the seed be also cut, the Opium is lost, as the juice would then run into the poppy-head, and again, if the incision is not deep enough, all the juice would not ooze out.

The repugnant practice of using saliva, and which is not always limited to the wetting of the knife, has been remonstrated upon, and water suggested as its substitute; but as this would

entail more trouble, and perhaps loss of time, they pretend that, unless saliva is used, the Opium would turn, or ferment.

As soon as a sufficient quantity of the juice, or Opium, is collected to form a ball, it is wrapped in poppy leaves, and put to dry in the shade for a short time only. There is no given size for cakes of Opium and they vary very much, being from a few ounces to two or more pounds, but in some villages they are made, on an average, larger than in others.

Short as is the time between making the incision and collecting the Opium, it is still the most precarious one of all, for either a shower, by no means an unusual thing at that time of the year, a heavy dew, or a strong wind would suffice to destroy the crop of all those fields, that the day previous had been prepared for collecting.

As a rule, every poppy-head is only cut once, but as each plant produces several heads which don't arrive together at maturity, the operation of the incision and gathering of the juice is generally gone over twice, or thrice, in the same field, when the opportunity is taken of recutting such heads as exceed the usual size.

Amongst the peculiarities of the poppy there is this, that its yield does not entirely depend upon its condition, the amount of dew falling the night after the incision is made having the greatest influence on both quantity and quality. The heavier it is, as long as it is not so heavy as to wash away the milk, the greater the yield, but in proportion to this increase is also the weakness or inferiority of the production; this accounts for the greater proportion of inferior Opium usually found in large crops.

The Opium grower is generally a small land proprietor, who cultivates as much as his own family circle can attend to; nor would it be possible for large land holders to grow this article on a large scale, owing to the want of hands, but supposing even that laborers could be obtained, such would be the necessary expenditure for the same, that it is very questionable whether it would pay.

From the grower the Opium passes into the hands of the merchants of the interior, who, after collecting it together, pack

it in gray calico bags, which they seal and place in a wicker basket of oblong shape; a very light weed is strewed between the cakes, to prevent them from sticking together, and in this condition it is brought down to Smyrna. And here it must be mentioned that, while Smyrna is the market proper for all the Opium grown in Asia Minor, nevertheless a very small quantity finds its way to the Constantinople market direct. The Opium remains in the baskets undisturbed till sold, and it is only on reaching the buyer's warehouse, that the seals are broken, and that the cakes are for the first time exposed. This takes place before buyer, seller, and public examiner, the last mentioned of whom then goes through the process of examining it piece by piece, and should either buyer or seller entertain a different opinion than his respecting any of the pieces, they are put aside and carefully re-examined at the end.

There are three qualities of Opium, viz: the *Prime, the Current, and the Inferior Opium, or Chikintee; a fourth quality might be said to exist, if we take to account the adulterated cakes, which are either entirely false, or a mixture of Opium with sand, gums, eggs, etc., in fact any thing considered least liable to detection. The prime consists either in the extra examination of the baskets, or what is more generally the case, in the Opium grown at certain districts. The current is the mercantile, or bulk of the crop, and the Chikintee is that rejected from both the prime and current qualities. Quality, however, is generally understood by the name of the place the article is grown at, and admitting that some places, on the whole, produce superior Opium to others, how far this may be correct in the case of a particular purchase is too obvious to require any comment. Besides, if place was a reliable guide as to quality, we come to the question, how is that of one place to be distinguished from that of another; of this we have a good illustration. The sales effected at the end of the season, as Opium coming from

* Known in this market under the name of *Yerly*, which word means "of this place," viz: that grown round about Smyrna, implying thereby that only this, and the whole of it, is prime; so far from this being correct, there are in the vicinity of Smyrna some places producing very bad Opium, while in some of the farthest districts the quality is first rate.

the renowned districts often amount to three and four times the quantity those districts can possibly produce; this anomaly is only a proof as to the capacity of other places of producing a quality equal to that of the famed ones.

Commercially speaking, there is no rule by which one can become a judge of Opium, of however moderate aspirations; this ability can only be acquired through many years practice. In examining this article the use of nearly all the faculties is required: color, appearance, weight, scent, etc., serve as a guide, for often a dark colored cake is as good as a light one, or both may be bad; one scent as good as another; soft, or hard, etc., etc., may both be good or bad. To be a judge of Opium, therefore, one must be guided by a combination of circumstances, so variable in themselves that, as before mentioned, it can only be acquired by great experience. Such being the case, it may easily be imagined what people think here of the system pursued in some markets, where it is mostly judged by its external appearance.

The first baskets of Opium arrive in Smyrna about the end of May, or beginning of June, but for several reasons it is not safe to effect any shipments before the month of August. First, too fresh Opium is liable to get heated; secondly, the Chikintee is not so easily detected, and thirdly it gives a loss in weight.

Apart from agricultural causes, the crop of Opium, like that of all other productions, depends in a great measure on the ruling prices at the close of the season, which influences its greater or lesser sowing, so that after a large crop, with low prices, a small crop, and of course high prices, are almost sure to follow, and *vice-versa*. As a guide to the probable ruling prices of a season, the extent of the crop is, of course, a very good criterion; to ascertain this, however, with any degree of accuracy, the greatest difficulty is encountered. First of all, the merchants stockholders, who know well the influence of quantity on price, are always ready to misguide one, and secondly, no account can be obtained from the Government tax gatherer, as the tithes are usually sold by auction; it is only by dint of great exertions and experience that any thing like the truth can be ascertained.

The best time for effecting purchases, as a rule, is at the commencement of a season; with a small crop, however, the chances are often most in favor to the buyer at the end of a season, for, according to the remark that after a small crop comes a large one, prices are generally affected towards the close by the coming crop.

From a record published by the writer some months ago respecting the crops and shipments of Opium for the last ten years, viz: from July 1857, to June 1867, the following items may be deducted:

Average Crops.

1857—58.	3026 cases.	Average price	16, 28*
1859—60.	3013 "	" "	18, 58
1860—61.	3381 "	" "	17, 29
1863—64.	2866 "	" "	17, 88

3000 cases @ 17. s. 6. d. being the average quantity and price for the above four years.

Short Crops.

1858—59.	1439 cases.	Average price	19, 76
1862—63.	2236 "	" "	18, 01
1866—67.	2246 "	" "	16, 92

2000 cases @ 18. s. being the average quantity and price for above three years.

Large Crops.

1861—62.	4180 cases.	Average price	14, 39
1864—65.	3893 "	" "	15, 20
1865—66.	4135 "	" "	13, 83

4000 cases @ 14. s. 6. d. being the average quantity and price for the above three years.

The total for the ten years is 30,415 cases, or an average of 3000 cases per year @ 16, 39, say 16. s. 4½ d.

The months of June represent the smallest shipments, viz: 1326 cases, or an average of 132 cases per month.

The months of October the largest, viz: 4979 cases, or an average of 497 cases per month.

* These prices are calculated in shillings, and hundredths of shillings, per English lb. free on board.

Before the epoch at which the writer's record begins a fair crop consisted of only 2000 baskets, and the average price was about 11 s. 6. d. The established progress of this article in so short a time is without parallel, the crops having nearly doubled themselves, and prices risen to fully 50 per cent. It would have been natural to suppose, that with such an increased production prices would have lowered in proportion, which no doubt would have been the case, if demand had not also kept pace. This, to-day, cannot be properly satisfied under a supply of say 3,500 baskets, beyond which only prices give way. It must not, however, be supposed that they can possibly go lower than the average of a full crop, for then it would not pay the agriculturist to cultivate this article, and would cause him to turn his attention to other and more profitable productions; this would naturally have the effect of diminishing considerably the ensuing crop, and raising its price. It is only in the farthest districts from Smyrna that the grower is obliged, as it were, to cling to Opium, for the expense of transit prevents the exportation of all other articles, which, remaining for local consumption, command only a low price. But as Opium alone, on account of its small bulk in comparison to value, can bear the forwarding charges, it is almost under any circumstances the best paying article for the said districts.

The fact must not be overlooked, that the demand is still slowly, but steadily increasing, and that on the other hand the productive capacities of the Opium districts are at their climax. When, therefore, prices are under or about a corresponding crop out of the last ten years, the opportunity should not be missed.

With reference to the average price of some twelve to fifteen years ago, it must be observed that the necessaries of life were at that time so much cheaper, that the then 11. s. 6. d. was perhaps more remunerate than the 16. s. 6. d. of the last ten years.

[NOTE.—This paper was published in Smyrna (Asia Minor) in April, 1868, in pamphlet form, by the author, who in prefatory note states that it was given at the request of several friends, and is based on his personal knowledge.]

PRODUCTION OF AMBER IN THE BALTIC.

The prodigious quantities of yellow amber collected by the explorers of Curischen Haff and the neighborhood of Memel, operating with 12 steam dredges and 3 ordinary dredge boats, have called attention anew to this interesting branch of commerce, now amounting to 35000 kilograms weight in a single year.

The results of recent researches show that the blue earths or ambraic littoral contains this precious substance in quantities averaging 25 to 160 grains per cubic foot.

The total production of the Baltic coast at present is nearly 100,000 kilograms, of which 50,000 are collected on the water courses and by fishing, 35,000 by dredging and 15,000 by trenching the sandy hillocks near the sea.

The value of amber varies infinitely, ranging between 7 cents and several hundred thalers (70 cts. each), and is fixed for each piece according to its color, size and form. A small part only can be employed for the mannfacture of cigar cases, brooches and other objects of art and luxury; the larger quantity, however, is used for beads to export to Africa, the south sea islands and the East Indies, where these articles have always been a favorite article of commerce, and have been in use in the east since the days of Herodotus.

About forty per cent. of the amber collected cannot be used for this purpose, owing to opacity or imperfections in structure. This quantity, viz., 40,000 kilos., is used for aromatic fumigation and for conversion into oil and lac of amber.

The oil and acid of amber are chiefly employed in the laboratories for the production of succinate of ammonia. Succinic acid is also used in dyeing and in photography. The amber varnish or lac is used for iron pipes, gates, machines and cast-iron, to which it is desirable to give an elegant deep black color. It is thought that this article will become much in vogue when its qualities are better known, and it is made already in large quantities in western Prussia.—*Annales du Commerce Exterieur et Jour. de Chim. Med.*

SOME REMARKS ON CRYSTALS CONTAINING FLUID.

By J. B. Dancer, F.R.A.S.

The author gave a brief history of the discovery of fluids in crystals, including Sir H. Davy's chemical experiments on the fluids and gasses obtained from the cavities in quartz crystals; Sir David Brewster's discovery of the pressure cavities in the diamond, ruby, emerald, amethyst, chrysoberyl, &c.; the existence of minute crystals in these cavities and the two new and remarkable fluids, which are immiscible, but sometimes found together in the same cavity—one a liquid hydrocarbon, named Brewstoline, the other Cryptoline; his experiments and examination of artificial crystals deposited from aqueous solutions; his examination of the Koh-i-noor diamond and others in the East India Company's museum; and the geological speculations to which these discoveries gave rise. Mr. Dancer mentioned the experiments of his late father and others in producing artificial gems by intense heat, and stated that his own attention was drawn to this subject some twenty-four years since, by Sir David Brewster presenting him with a specimen of topaz containing fluid. Since that time he had examined a large number of crystals, of various kinds, from the collections of friends; and had found fluid in quartz from South America, Norway, the Alps, Ireland, Snowdon, and the Isle of Man; and in fluor spar from Derbyshire; this latter specimen contained a considerable quantity of fluid, which burst the crystal at 180° temperature.* He suggested the employment of the microscope as a valuable assistance in detecting spurious from real gems; very few of the latter are perfect, and the flaws and cavities are so distinct in character from those which are so abundant generally in artificial gems that very little experience is sufficient for the purpose. This mode of testing of course is limited to transparent crystals, but might be employed when the usual methods are not practicable. He also mentioned Mr. Sorby's (F.R.S.) discovery of fluid cavities in the quartz of granite, in the quartz of volcanic rocks, and also in the feldspar ejected from the crater of Vesu-

*After this paper was written, Sir David Brewster informed the author that the fluid contained in crystals of fluor spar was water, and that the cavities burst at a temperature of 150°.

vius, and Mr. Sorby's method of determining the temperature at which various rocks and minerals are formed. At the conclusion of the meeting, crystals containing fluid were exhibited under the microscope, and the expansion of the fluid by elevating the temperature of the crystal whilst under examination.—*Chem. News, March*, 1868.

ON CRYSTALLIZATION OF SULPHUR.

An interesting experiment has been made by M. Schützenberger upon the crystallization of sulphur. He filled a mattrass of a capacity of 150 or 200 grammes, with refined sulphur, commercially pure, so that when fused the liquid occupied the whole of the space below the neck; the upper part of the neck was drawn out into a capillary tube which was twisted several times, but left freely open to the atmosphere. The sulphur being melted in a bath of oil heated to 120°, the flask was placed in water heated to 95°. In these conditions the sulphur remains perfectly fluid for hours, even when occasionally moved and drawn out of the hot water. If the temperature be made to fall very slowly, transparent crystals, possessing the same density as the melted sulphur, form either on the surface or in the midst of the fluid at about 90°. The mass of crystals gradually augments, but with great slowness; sometimes they are isolated, at others united in groups of two, three, four, &c. The amount of crystals being considered sufficient to separate them, the mattrass is sharply inverted, so as to cool and solidify the melted sulphur in the neck. Thus the crystals are separated from the rest of the sulphur, and only remain suspended by their peaks. They are transparent, and remain so indefinitely; in form they are octahedral, and bear close resemblance to natural crystals. Measurement of the angles has confirmed their identity. The experiment is surer when two or three drops of sulphide of carbon are added to the sulphur before fusion; the phenomenon takes place, however, independently of this admixture. The results are similar to those of M. Pasteur, who observed the formation in a solution of sulphur in a hydrocarbon, first of prismatic crystals, afterwards, when the temperature was sufficiently low, of octahedra. By

this experiment of M. Schützenberger's, it is proved that melted sulphur crystallizes below 100° in octahedra of the fourth system, without the aid of any solvent. The facts will probably be turned to account in the study of the formation of natural crystals.—*Lond. Chem. News*, May 22, 1868.

ON THE MANUFACTURE OF PHOSPHATE OF SODA AND FLUORIDE OF SODIUM.

By M. Jean.

A note on the manufacture of phosphate of soda and fluoride of sodium has been published by M. Jean. The process usually adopted in the fabrication of neutral phosphate of soda consists in attacking the tribasic phosphate of lime, either in the form of nodules or calcined bones, with sulphuric acid; thus a solution of acid phosphate of lime containing some sulphate and excess of sulphuric acid is obtained. This solution of acid phosphate of lime is treated with carbonate of soda, when phosphate of soda and carbonate of lime result, but a large quantity of sulphate of soda, or otherwise of sulphate of lime, and free sulphuric acid requires separating: repeated and carefully conducted crystallizations are therefore necessary. M. Jean made experiments with a view to founding a better process.

The following are notes of experiments:—(I.) In fusing a mixture of one equivalent of tribasic phosphate of lime, two equivalents of sulphate of soda and carbon in excess, and extracting with cold water, a strongly sulphurous liquor containing phosphate of soda was obtained. The residue, chiefly oxysulphide of calcium, contained about two-thirds of the phosphate of calcium unattacked. (2.) A second experiment made with three equivalents of sulphate gave soluble acid phosphate 14 per cent., acid in an insoluble form 13·71 per cent.: with three equivalents, then, about half the phosphate is obtained in the form of neutral phosphate of soda. (3.) By increasing the amount of sulphate to six equivalents, 20·6 per cent. was the yield of soluble phosphate, while the residue contained 1·933 per cent. of acid combined with lime. M. Jean attributes this small quantity of phosphoric acid to the action of caustic lime, always present to a slight extent in the residue, upon the phosphate of soda after

lixiviation. The decomposition of the tribasic phosphate of lime into neutral phosphate of soda may then be considered complete. Unfortunately the phosphate obtained in this process is mixed with a large proportion of sulphide of sodium, rendering the separation by crystallization very difficult, and consequently destroying the industrial value of the process. The reaction has given better results in the preparation of fluoride of sodium. A mixture of 40 parts of fluoride of calcium, 80 of sulphate of soda and carbon in excess, was fused in a metal crucible. The mass exhausted with water gave a solution containing sulphide and fluoride of sodium; only a trace of hydrofluoric acid was detected in the residue, composed as before of oxysulphide of calcium. Another fusion was made, in which carbonate of lime was added, to endeavor if possible to remove the soluble sulphur compounds. The mixture was made of 100 parts of fluoride of calcium, 140 of carbonate of lime, 200 of sulphate of soda and carbon. In treating the mass with water, a limpid solution of fluoride of sodium was obtained quite free from sulphide. Traces of hydrofluoric acid were detected in the residue. By concentration and crystallization, fluoride of sodium in great purity is obtained. Should the application of this salt at any time become important, this process will enable fluoride of sodium to be manufactured in large quantity and at a low price.—*London Chemical News*, May 22, 1868.

DEATH FOLLOWING THE ADMINISTRATION OF TWO-FIFTHS OF A GRAIN OF ELATERIUM.

By A. G. Craig, M. D., Ghent, Ky.

On the morning of the 23d of March, 1868, I was called to see Mrs. G.——, aged 70 years, whom I found with dropsy, dependent on disease of the heart and liver. Her abdomen was enormously distended, and there was also considerable anasarca. She had been for several weeks, previous to this time, under the treatment of a homœopathist, who pronounced her case to be "wind in the intestines," and promised a cure in a few weeks. I informed the family that it was not possible for her to recover; that she would live only a short time; and that all I could do

would be to give anodynes to relieve her of pain, and prolong life by the administration of diuretics, hydragogue cathartics, etc. She was very feeble—decubitus on left side. Her skin was cool and dry; pulse 100, small, quick, and feeble; breathing slow and labored; tongue rather dry, and covered with a yellowish coat; considerable thirst; appetite gone, and stomach so irritable that almost everything she swallowed was ejected; bowels not moved for two days, and then with castor oil. I administered to her two-fifths of a grain of elaterium, and took my departure. At four o'clock in the afternoon I was summoned to her bedside. I was informed that a few minutes after she had taken the medicine she commenced purging, and had had a dozen or more watery stools before my arrival. She was greatly prostrated, could only speak in a whisper, and as I approached her she took me by the hand and said, "Doctor, I fear you have killed me." Her pulse was scarcely perceptible. I commenced at once with the administration of stimulants, and small doses of opium, combined with the acetate of lead. Her bowels were moved every five or ten minutes—stools watery. The purging was not fully arrested until 10 o'clock, P. M. I left at midnight. She never rallied. Death took place at five o'clock, P. M., March 25th.

I report this case to warn the practitioner against commencing with the dose of elaterium recommended in the U. S. Dispensatory, 12th edition, page 364: "The full dose of commercial elaterium is often from one to two grains; but, as in this quantity it often vomits if of good quality, the best plan is to give it in the dose of a quarter or half of a grain, repeated every hour until it operates." I learned, on my second visit to this patient, that a tablespoonful of castor oil usually operated within five minutes after administration, and that the sulphate of magnesia, in an ordinary dose, purged her almost as severely as the elaterium, and produced similar dejections. It would be well for the practitioner to inquire into the idiosyncrasies of his patient before administering remedies, which I regret I neglected to do in this case.—*Western Journal of Medicine*, May, 1868.

NOTICE.

American Pharmaceutical Association.

The sixteenth annual meeting of the American Pharmaceutical Association will be held in the city of Philadelphia, on the second Tuesday (the 8th day) of September, 1868, at 3 o'clock, P. M., at the new Hall of the College of Pharmacy.

It is confidently expected that the various standing committees, through their chairmen, will be prepared in time to furnish the Association with full and highly instructive reports on the many interesting subjects which should occupy our earnest attention.

The objects of the Association and qualifications for membership are set forth in Articles I and II, Section 1, of the Constitution, as follows:

ARTICLE I.

This Association shall be called the American Pharmaceutical Association. Its aim shall be to unite the educated and reputable pharmaceutists and druggists of the United States in the following objects:

1st. To improve and regulate the drug market, by preventing the importation of inferior, adulterated or deteriorated drugs, and by detecting and exposing home adulteration.

2d. To establish the relations between druggists, pharmaceutists, physicians and the people at large upon just principles, which shall promote the public welfare and tend to mutual strength and advantage.

3d. To improve the science and the art of pharmacy by diffusing scientific knowledge among apothecaries and druggists, fostering pharmaceutical literature, developing talent, stimulating discovery and invention, and encouraging home production and manufacture in the several departments of the drug business.

4th. To regulate the system of apprenticeship and employment so as to prevent, as far as practicable, the evils flowing from deficient training in the responsible duties of preparing, dispensing and selling medicines.

5th. To suppress empyricism, and as much as possible to restrict the dispensing and sale of medicines to regularly educated druggists and apothecaries.

ARTICLE II.—*Of the Members.*

Section 1. Every pharmaceutist and druggist, of good moral and professional standing, whether in business on his own account, retired from business, or employed by another, and those teachers of pharmacy, chemistry and botany who may be specially interested in pharmacy and materia medica, who, after duly considering the objects of the Association and the obligations of its Constitution, are willing to subscribe to them, are eligible to membership.

Those desiring to join are requested to apply for blank applications to the Chairman of the Executive Committee, Thos. S. Wiegand, N. E. cor. 6th and Arch Sts., Philad,, or to the Permanent Secretary, John. M. Maisch, 1607 Ridge Avenue, Philad.

JOHN MILHAU, *President.*

New York, June 9th, 1868.

Exhibition connected with the 16th Annual Meeting of the American Pharmaceutical Association.

The Committee of Arrangements propose to have an exhibition of articles connected with the drug business, including chemicals, drugs, pharmaceutical preparations, apparatus, books, and miscellaneous articles. Those members of the Association and others wishing to contribute to the display will please address a note to William C. Bakes, 800 Arch St., Chairman of the sub-committee on exhibition, stating the character of the articles they propose exhibiting. All articles should be delivered free of expense at the hall of the Philadelphia College of Pharmacy, Tenth St. above Cherry, between the 1st and 5th of September, 1868.

Strangers arriving in Philadelphia to attend the meeting will find a committee of reception at the Continental Hotel, and information may be had from the Chairman and other members of the committee.

ALFRED B. TAYLOR, 1015 Chestnut St.,
WILLIAM PROCTER, JR., 500 S. 9th St.,
PROF. EDWARD PARRISH, 800 Arch St.,
JAMES T. SHINN, Broad and Spruce Sts.,
CHARLES BULLOCK, 6th and Arch Sts.,
WILLIAM C. BAKES, 800 Arch St.

List of the Contributors to the Building Fund for the new Hall of the Philadelphia College of Pharmacy.

It has been deemed right and proper to publish a list of those contributors to the building fund of the College of Pharmacy who have already paid their subscriptions, which list may be considered as an official acknowledgement of the sums specified; leaving the names of those other contributors who have not paid in, and those members and others yet to be called upon who may be disposed to aid the work, for a continued list to be published in September, before the inauguration of the Hall. The names are put in the order that the payments were made, and the amounts are in all cases the voluntary gifts of the contributors, some of whom could illy afford the moderate sums given, but who manifested a generous interest in the success of the Committee, by giving their mite.

As the sum raised by contributions is not yet half of the balance required to complete the building, it is very desirable that every pharmaceutist who intends contributing should do so at once to the extent of his ability, that the Building Committee may not be hampered in completing their task,—and send his contribution to the Treasurer, Dillwyn Parrish, No. 800 Arch St., Philadelphia. Of the many graduates of our College who have succeeded in business, surely there are some who feel a warm side for their alma mater, and will help her to rebuild her walls.

Powers & Weightman	$1000 00	John S. Erben	50 00
W. B Webb	25 00	Mulford Marshall	25 00
Bennet L. Smedley	10 00	Cash	5 00

Caleb R. Keeney	25 00	Theophilus Fischer	5 00
Wm. Taylor	25 00	H. C. Blair's Sons	50 00
Henry Bower	150 00	J. L. Smith	25 00
Rosengarten & Sons	200 00	H. C. Fox	200 00
John Goodyear	20 00	John Wyeth & Bro	100 00
E. M. Roche	10 00	Beates & Miller	25 00
Kearney & Brother	5 00	Wm. Biddle	50 00
Jos. B. Correll	2 00	Geo. Gardom	10 00
J. S. Miller	5 00	Jos. C. Turnpenny	50 00
C. H. Merklin	1 50	Geo. Y. Shoemaker	20 00
F. Zerman	10 00	Henry Cramer	50 00
Herman Fritsch	10 00	Henry Blithe	5 00
Daniel S. Jones	50 00	Jos. Heathcote	5 00
S. S. Bunting	50 00	Chas. W. Hancock	25 00
O. S. Hubbell	25 00	L. S. Gilliams	5 00
J. B. Moore	20 00	Wm. H. Weatherly	5 00
Jos. Harvey	1 00	Robert England	20 00
J. W. Kyle	1 00	Edward Gaillard	5 00
Schott & Ruch	1 00	J. Kenworthy	20 00
Thos. J. Husband	50 00	Hance, Griffith & Co	100 00
Wilson H. Pile	20 00	J. W. S. Delavan	10 00
S. Creadick	3 00	W. F. Simes & Son	50 00
W. B. Thompson	10 00	Turner & Wayne	100 00
Alonzo Robbins	25 00	A. H. Yarnall	50 00
Robert Nebinger	25 00	Robert C. Davis	50 00
Jas. C. Wells	10 00	Newbold & Bro	5 00
E. R. Perrot	5 00	Joseph Jeanes	100 00
R. Keys	10 00	John S. Newton & Bro	15 00
J. Weber	5 00	Alfred Tatum	10 00
N. Ranck	10 00	S. H. Warner	2 00
A. Wiltberger	100 00	John E. Grove	5 00
Smith & Shoemaker	100 00	A. W. Robbins	2 00
Wetherill & Bro	200 00	W. E. Knight	25 00
Hansell & Bro	40 00	Dillwyn Parrish	100 00
R. F. Fairthorne	5 00	Paul G. Oliver	20 00
Carter & Scattergood	100 00	Isaac Sharpless	5 00
J. F. White	10 00	Peter Williamson	200 00
W. J. McClain	5 00	G. D. Wetherill & Co	200 00
John A. Milliac	3 00	Louis G. Bauer	20 00
Wm. Procter, Jr	100 00	V. H. Smith & Co	25 00
Jas. T. Shinn	100 00	G. H. Davis	25 00
Geo. M. Snowden	20 00	John Bley	10 00
J. L. Shoemaker	10 00	Philip S. Reed	5 00
Thos. E. Pryor	5 00	John Moffet	5 00
L. A. Messinger	5 00	C. H. Eggert	5 00
B. F. Johnson	5 00	G. W. Eldridge	15 00
John M. Whitall	100 00	J. B. Ferguson	5 00
Edwin Thomas	20 00		

Editorial Department.

THE NEW COLLEGE HALL.—THE MEETING OF THE ASSOCIATION.—Notwithstanding the very unfavorable weather since this work was commenced, the advance already made promises to get the building ready by the first of September, or so nearly completed that it may be used for the purposes of the annual meeting of the American Pharmaceutical Association. On the strength of this opinion the announcement is made on page 375, and the invitation given to hold an exhibition of articles connected with our profession,—chemicals, drugs, pharmaceutical preparations, apparatus, and miscellaneous articles. In view of this need for the hall, it will require that every exertion should be made to further the arrangements for its completion. On the 24th of June the "corner stone" was laid, and a deposit made in it of a glass-stoppered bottle containing various printed documents and papers connected with the College, and a copy of the Public Ledger. But few members were present, owing to a misunderstanding of the time, and no address was made. The foundation walls have been successfully and well built, and the first story of brick-work up, and ready for the second floor joice. As the time approaches for occupying the Hall, the several committees having in charge the library, museum and apparatus, will have a busy time in transferring their several charges to the new premises, and getting all arranged. The funds necessary to complete the building have not been all collected. Whilst many have been quite liberal in their contributions, many have been less so, and others disposed to give the cold shoulder. This should not be. Every pharmaceutist should feel an interest in the success of his profession, and as this depends almost wholly on pharmaceutical education, he should feel and manifest a practical interest in the only institution in our city connected with that profession. But, no doubt, there has been a loss sustained by the want of vigor and earnestness which for some years past has marked the policy of the Philadelphia College of Pharmacy. What has been done has been the work of but a fraction of its members,—most of these do not come to the meetings, and there have been no occasions to bring them together that they may become acquainted with each other, and interested in the Institution to which they belong. It has appeared to us that the present juncture offers a good opportunity to work a change in these regards. A new Hall, to build which the material aid of all members and others is needed, and the inauguration of the new Hall by the meeting of the national Association,—certainly these are sufficient reasons for bringing all together, earnestly, professionally, and scientifically. Every reputable pharmaceutist in this city should be a member of the College of Pharmacy, and of the National Association, and in this way, if no other, aid in raising the status of our profession. The Pharmaceutical Association

now numbers more than seven hundred members in all parts of our country, and representatives from all sections will be in attendance. We hope to see many faces from south of the Potomac come to join hands in this truly national society of pharmaceutists.

In relation to the contributions to the building fund, the Treasurer of the Building Committee has furnished a list which will be found at page 376, and we hope it will induce many others to extend their aid in season.

Dr. Robley Dunglison, so long and favorably known as a teacher and writer of medicine, has resigned the chair of Physiology in the Jefferson College, and the vacancy thus created has been filled by the election of Dr. John Aitken Meigs, of Philadelphia. Although not personally acquainted with Dr. Meigs, we are informed by those who are that the choice of the Trustees is eminently judicious.

Erratum.—In the notice of William Herapath in our May number, we inadvertently attributed to him the discovery of iodosulphate of quinia, which was made by his son, Dr. William A. Herapath, also a chemist.

Annuaire de Therapeutique de Matiere Médicale de Pharmacie et de Toxicologie pour 1868; contenant le Résumé des Travaux Therapeutiques et Toxicologiques publiés en 1867 et les formules des medicaments nouveaux; suivi d'un mémoire sur café, par A. Bouchardat. 28e année. Paris, Germer Bailliére, 1868: pp. 328, 24mo.

Again this little annual presents itself for notice. It is the twenty-eighth of the series, and consists of extracts from the periodical literature of medicine and pharmacy during 1867, principally continental. The volume for 1866 was translated and published last year, and we presume this also will be rendered. The articles of interest under the head of narcotics, anæsthetics, stimulants, alteratives and revulsives are numerous, but we have only space to offer an extract from one of the latter. M. Rigollet, in speaking of his *mustard paper*, (sinapisme en feuilles) and referring to its advantages in avoiding the use of linen and the inconveniences of preparing an ordinary poultice, says:

"On a sheet of paper of a certain firmness, I fix a layer of flour of Alsace mustard one millimetre (one-thirteenth of an inch) thick. It was not difficult to imitate the industrial process for the manufacture of glass paper or velvety wall paper, in which glass powder or cloth nap are held on the surface by a layer of glue. But it was necessary to find a viscous liquid which contained neither water, alcohol or resinous matter to bind the mustard. Water would develop the essential oil; alcohol coagulate the myrosine, and stop the production of volatile oil, whilst the fatty bodies would prevent the action of water on the mustard to develop its power." "Only one substance has succeeded; this is caoutchouc dissolved in bisulphuret of carbon or a volatile oil. Before the operation the solvent evaporates and leaves the mustard meal imprisoned in a network of fibres adhering to the paper, and which are as permeable by water as the meshes of a seive. This sheet of paper, thus prepared, becomes

an active sinapism, if before using it is soaked in water during 12 or 15 seconds. Six grammes (a drachm and a half) of mustard under this form suffices to irritate with much energy a square decimetre of surface (four inches). It is true that I concentrate the properties of the mustard by removing its 28 per cent. of fixed oil, an idea which is not new, but suggested long ago by Soubieran, and which is easily effected by sulphuret of carbon or by light coal oil."

More than fifty pages are devoted at the end to the subject of coffee, in its hygienic and therapeutic aspects —the result of a conference of "the Polytechnic Association," held at Paris July 28, 1867,—and which includes a historical account of its introduction into Europe. Those of our medical and pharmaceutical readers who are familiar with the French will derive advantage from the importation of the volume, which is quite moderate in price.

A Manual of the Dissection of the Human Body. By Luther Holden, F.R.C.S., Assistant Surgeon of and Lecturer on Anatomy at St. Bartholomew's Hospital, London; with notes and additions by Erskine Mason, M.D., Demonstrator of Anatomy at the College of Physicians and Surgeons, New York. Illustrated with numerous wood engravings. New York, Robert M. De Witt, publisher, No. 3 Frankfort St.: pp 588, octavo. (From the editor and publisher.)

It is rarely that one meets with a book that keeps so closely and regularly to the text as does Holden's Manual. Designed as a guide to the student in the very important study of the practical anatomy of the human body, it enters on the subject in a clear, straightforward manner, beginning with the neck, and proceeding through the various portions of the system of muscles, nerves, ligaments and vessels, and illustrating them with a great variety of excellent original wood-cuts and diagrams, which greatly facilitate their comprehension.

The style is easy, the descriptive phraseology in short sections, and free from redundancy, and the type, press-work, paper and binding unusually clear and excellent. The commencing of each paragraph with the technical name of the organ or part described, in large, bold type, is a great merit, from the student's stand-point.

The *tables* at the end give a useful summing up, in the form of a series of bird's eye views of the arrangement of the parts to be studied.

The additions of the editor appear to be judicious, and, on the whole, the volume must prove to be a valuable addition to the means of teaching anatomy.

Therapeutics and Materia Medica: a systematic treatise on the action and uses of medicinal agents, including their description and history. By Alfred Stillé, M.D., Professer of Theory and Practice of Medicine, &c., in the University of Pennsylvania, &c., &c. Third edition, revised and enlarged, in two volumes. Philadelphia, Henry C. Lea, 1868: pp. 1688, octavo.

This important work now for the third time comes to us for notice, and were it not quite unnecessary to bring forward its principal features, now so generally known to medical and some pharmaceutical readers, we might reiterate what has been said of them on former occasions, in vol. xxxii, p. 190, and vol. xxxvi, p. 542. The author informs us in the preface to this edition that he now treats for the first time of *chromic acid*, *permanganate of potassa*, the *sulphites of soda*, etc., carbolic acid, nitrous oxide, *rhigolene*, and *Calabar bean;* and that the articles on bromine and electricity are very materially changed and extended. On other occasions we have pointed out several omissions or errors, several of which were of sufficient importance to merit attention, in regard to the pharmaceutical part of the work. As we find that these errors and omissions have been reproduced and continued in the third edition, there is no encouragement to point out more; yet there are some omissions which strike us so forcibly that, at the risk of wasting the space they occupy, we will state them.

Under the article Veratrum viride no allusion is made to the recent careful experiments of Chas. Bullock on the chemical constituents of this drug, showing that it contains two distinct alkaloids, and that neither of them is *identical* with veratria. Mr. Bullock also corrects the previous belief, that the resin of Veratrum viride possessed sedative powers, and was able to show that this quality, previously attributed to it, was due to adhering alkaloids.—(Amer. Jour. Pharm., Sept. 1865, March, 1866.)

In the Proceedings of the American Pharmaceutical Association, volume for 1865, Prof. Maisch demonstrated that toxicodendron owes its irritant properties to a peculiar acid, to which he gave the name of *toxicodendric* acid, and that the physiological properties of the drug were due to this acid; he made and described experiments on his own person. No allusion is made to this paper or its results, though extensively copied in European Journals.

Crotonole, as the irritant principle of Croton tiglum, is not referred to; and lobelina is described as "a clear *volatile* liquid," when it is well ascertained that it is not volatile, but is destructible by heat. We have not been able to find any mention of *Hydrastis canadensis*, *Leptandra virginica*, *Gelsemium sempervirens*, *Gillenia trifoliata*, *Matico*, *Nectandra*, *Stillingia*, Vanilla, and other officinal drugs of greater or less importance, and which the student should be able to find in so comprehensive a work. Although brandy and whiskey are alluded to under alcohol, they, equally with wine, which is prominently noticed, deserve separate chapters.

In pointing out these omissions, it is only that they may be noticed in a new revision; believing, whatever may be the author's opinion of their merits, that they deserve to be described and noticed quite as much as many foreign or antique drugs which have long figured in pharmacological works, and which here find a place.

Compte Rendu des Congrès Pharmaceutiques reunis Aout 1867, *a l'école superieure de Pharmacie de Paris.* Douzieme Session du Congrès des Sociétés de Pharmacie de France. Deuxime Session du Congrès International des Associations et Sociétés de Pharmaciens. Paris, Bouchard-Huzard; pp. 328, octavo: in paper.

The conventions of which this volume constitutes the proceedings met in Paris between the 17th and 24th of August, 1867, and have already been alluded to in previous numbers. The first 128 pages refer to the Congress of the French Societies, whilst the last 200 pages refer to the international Congress, to which delegates were sent from this country. Our notice given previously will suffice; but it is with regret that we observe that, by some oversight, the name of our friend Albert E. Ebert, as a delegate from the Chicago College of Pharmacy, does not appear in the proceedings. This must be accidental, but it has given offence to the gentlemen of the Chicago College. Our belief is that it is entirely accidental, as M. Robinet, the Secretary is beyond all suspicion of intentionally giving cause of offence. We doubt not the omission will be corrected in the next volume issued. The next Congress will be in 1869, and will probably be held in Vienna, when the essay of the first authoritative Universal Pharmacopœia will probably be considered, and possibly adopted. It will be long before the ameliorations sought to be introduced into pharmacy by this Congress will be able to assimilate the practice of England and the United States with that of continental Europe. Meanwhile, the intercourse of national societies will pave the way for mutual good offices, and whatever is best and most desirable in the pharmacy of every country may be offered in all for acceptance.

Proceedings of the American Academy of Arts and Sciences from Sept. 11, 1866, *to June* 11, 1867: pp. 144.

This continuation of the proceedings has been received, and should have been acknowledged in our last issue. Among the subjects it treats of is an obituary notice of the late Prof. A. D. Bache.

Report of the Commissioner of Agriculture for the year 1866. Washington, Government Printing Office, 1867: pp. 656, octavo: with 36 illustrations. From Mr. Daniel S. Fox, of Washington, D. C.

Much has been said and written regarding the wastefulness and want of utility of what is done in this department of the Patent Office operations, and especially in the manner of disseminating seeds without sufficiently testing their merit. Be this as it may, there can be no doubt that much good comes of the publication of the annual volume of the Commissioner, which presents in a permanent and readable form a digest of much that floats through the periodicals, and which may be passed over. Among the items of interest is "Pisciculture with reference to American waters," by Theodore Gill, M. D.,—a subject of great interest to many persons here, and which is attracting careful study in Europe, with a view

to supplying human food. Another is the Cultivation of Cinchona, being a report on the subject by Dr. Thomas Antisell, who, after giving the results of the English and Dutch efforts in India, advocates the attempt being made in the Sierra Nevada region of California. Whilst various nations are thus making praiseworthy efforts to propagate this useful genus of medicinal plants, it does not appear that any political influence has been given by other nations to induce the South American republics to use their authority to restore the fast disappearing forests of cinchona. Would it not present a legitimate subject for diplomatic influence by the ministers of other nations, on the score of humanity?

Annual Report of the Board of Regents of the Smithsonian Institution; showing the operations, expenditures, and condition of the Institution for the year 1866. Washington, 1867: pp. 469, octavo; being miscellaneous document No. 83, published by the 39th Congress, second session. From Mr. Daniel S. Fox, of Washington, D. C.

Annual Report of the Commissioner of Patents for the year 1866, in three volumes, pp. 2741, octavo. Washington, Government Printing Office, 1867. From Mr. Daniel S. Fox, of Washington, D. C.

The Trustees of the Smithsonian Institution again offer their annual report. Prof. Henry, in his report, informs that the fund, by the good management of the Trustees, is now nearly $150,000 more than the original bequest; that the library of the Institution has been transferred to the library of Congress, which, while it curtails in some measure the personal convenience of the investigators immediately connected with the Institution, really gives them the advantages of the great library of Congress, which, including the recent purchase of the collection of Mr. Force, is the largest library in the United States. The measure receives the approval of Professor Henry, who would also like to see the museum transferred to other auspices, so that the whole proceeds of the fund might be disposed of for the "increase and diffusion of knowledge among men." That Congress will eventually gather all the collections in one extensive national museum, will probably be the ultimate result.

The reconstruction of the building has been carried on during the past year "as rapidly as a due regard to the character of the work would allow." The publications issued by the Institution have been as extensive as usual, and include astronomical, geological and natural historical researches and observations.

The system of international scientific and literary exchanges, so long and usefully carried on, has been maintained during the year, 1170 packages being sent abroad, and over 8000 received in return. Many other features of the report claim notice, but our space will not admit of further remark than to express the hope that this valuable Institution may long continue to extend its influence for the benefit of all men.

The two first volumes of the Patent Office Report are a descriptive catalogue of the patents of 1866; whilst the third volume, of 1096 pages,

consists wholly of plates and diagrams of the patents. The immense extent of the Patent Office operations may be estimated approximately when three such volumes are required to give an outline of the patents issued in a single year.

Circular No. 1. *War Department, Surgeon General's Office, Washington*, June 10, 1868.

Report on Epidemic Cholera and Yellow Fever in the Army of the United States during the year 1867. Washington, 1868: pp. 195, quarto, in paper. From Surgeon General Barnes.

This volume consists of the report of Assistant Surgeon J. J. Woodward, U.S.A., to the Surgeon General, on these epidemics in the army, followed by statistical tables and extracts from the reports of army officers at the various southern and south-western posts where these diseases prevailed. The volume is highly creditable to the Department, and will be valued by all who feel interested in the study of these destructive epidemics in connection with military discipline and exposure.

Lessons in Physical Diagnosis. By Alfred L. Loomis, M. D., Professor of the Institutes and Practice of Medicine in the medical department of the University of New York, &c. New York, Robert M. De Witt: pp. 159, octavo.

This work has been written "in compliance with the request frequently made of the author's classes in physical diagnosis, to furnish them with a guide in the practice of this art." The author claims to have been influenced by a desire "to collect into a plain and comprehensive compend the results of the research of many inquirers," rather than to assert any views of his own. The book is illustrated with several cuts, and is well printed and bound.

THE AMERICAN NATURALIST.—Among the many exchanges which come to us monthly, none is more welcome than the American Naturalist, and certainly none better printed. The July number has already come to hand, and, being devoted to marine plants and animals, is called the "sea-side number," and will be sought as a companion by the sojourners of Newport and Cape May.

Lessons in Elementary Chemistry, inorganic and organic. By Henry E. Roscoe, B.A., F.R.S., Professor of Chemistry in Owen's College, Manchester. New York, Wm. Wood & Co., publishers, 61 Walker St.; 1868: pp. 383, 12mo. From the publishers, through Lindsay & Blakiston. Received too late for notice in this number. Price, $1.50.

Materia Medica for the use of Students. By John B. Biddle, M.D., Professor of Materia Medica in Jefferson Medical College, &c. Third edition, enlarged, with illustrations. Philadelphia, Lindsay & Blakiston, 1868: pp. 384, octavo. From the publishers; too late for notice in this number. $4.00.